THE ROLE OF BUSINESS INCENTIVES IN THE DEVELOPMENT OF RENEWABLE ENERGY TECHNOLOGIES

HEARING

BEFORE THE

SUBCOMMITTEE ON
ENERGY DEVELOPMENT AND APPLICATIONS

OF THE

COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

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THE ROLE OF BUSINESS INCENTIVES IN THE DEVELOPMENT OF RENEWABLE ENERGY TECHNOLOGIES

TUESDAY, JULY 13, 1982

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
SUBCOMMITTEE ON ENERGY DEVELOPMENT AND APPLICATIONS,
Washington, D.C.

The subcommittee met, pursuant to call, at 9:35 a.m., in room 2318, Rayburn House Office Building, Hon. Don Fuqua (chairman of the subcommittee) presiding.

Mr. FUQUA. The subcommittee will be in order.

We would like to welcome our witnesses and guests to this important hearing on the role of business incentives in the development of renewable energy technologies.

In our efforts to create an effective strategy for solar development, our committee has consistently had to deal with the problem of commercialization. Most of the renewable technologies that we authorize in the DOE budget depend on the economies of mass production for their ultimate success in the marketplace.

But mass production requires a big capital investment and that, in turn, requires the assurance of a sizable market for the product.

The tough question is how do you get the capital needed for mass production before you have either a cost-effective product or an assured market?

Over the years, our committee and DOE have tried a number of strategies for dealing with this problem. We have tried big demonstrations, mass purchases, and elaborate commercialization plans.

None of these have worked as well as we hoped, and all have been quite expensive.

Today we are going to investigate a more modest approach, which appears to be paying big dividends. This is the 15-percent business energy tax credit for renewable energy systems that was included in the Windfall Profits Tax Act of 1980.

We received an unprecedented degree of support for this tax credit at our DOE authorization hearings this spring. Witnesses who supported the DOE renewable energy programs—and those who did not—all agreed on the need to retain this tax incentive. Witnesses from the photovoltaics, solar thermal, wind, and OTEC industries all testified about the importance of the credits to their ability to develop and demonstrate new technologies.

Because of that support, Mr. Fish and I will be introducing a bill to extend the business tax credits for renewable energy systems

from 1985 to 1990. We will be doing this in order to provide the renewable energy industry with a stable planning horizon for the orderly development and marketing of the next generation of renewable technologies. Mr. Matsui and Mr. Heftel of the Ways and Means Committee have graciously offered to cosponsor this legislation and Mr. Fish and I will be circulating a letter to all committee members urging them to sign.

The purpose of today's hearing is to examine the actual effect of business incentives on the decisions made by manufacturers, utilities, and financiers to develop and market solar technologies. How effective have existing incentives been in stimulating private investment in R&D? Do they compensate for recent budget cuts in systems development and demonstrations? What will be the effect of extending these incentives, as proposed by Mr. Fish and myself in our legislation?

Our witnesses today are uniquely well-qualified to address these issues. Our first panel consists of financial and energy experts who can explain how business incentives affect the decisions of the investment community. The second panel consists of manufacturers who can discuss the impact of tax credits on their plans for renewable energy systems.

We want to welcome all of you to our committee.

Mr. Fish, do you have a statement to make?

Mr. FISH. Yes, thank you, Mr. Chairman.

I am particularly pleased that we have scheduled these hearings today on the role of business incentives for renewable energy technologies. Our subcommittee has heard many times about the promising commercial applications of solar and other technologies. I think it is important for us to make sure that the fruits of our energy R&D programs do reach the marketplace.

The energy situation is certainly much brighter than it has been in the past. Recent trends in conservation and oil imports have been encouraging.

But I hope we would not be lulled into a false sense of complacency by our current situation. As recently as last Sunday's New York Times, Dan Yergin of Harvard again pointed out what the drastic consequences would be if we faced a third energy crisis.

While conservation has been important, there are strong indications that economic conditions have been responsible for reduced oil demand. This situation makes it imperative that we continue to press forward with development of all of our domestic energy resources, including our promising renewable energy resources. The need for solar and other renewables is just as real today as it was in 1974, when the Federal Government finally embarked on the development of these resources.

Over the past several months our subcommittee has heard a great deal of testimony on the future of renewable energy industries. By and large, many of our witnesses strongly recommended tax incentives as the most effective means to stimulate the development of new energy technologies. Without the present energy tax credits and even extended credits, they indicated that promising technologies such as wind, photovoltaics, and others would not obtain the market support that is needed to tap their potential.

This is extremely disturbing, and I hope we can explore this question in more detail today. I am very pleased to have our eminently qualified witnesses with us today, as we continue to look at the most fiscally responsible ways to help our Nation prepare for our energy future.

[The opening statement of Mr. Fish follows:]

OPENING STATEMENT OF HON. HAMILTON FISH, JR.

Thank you, Mr. Chairman. I am particularly pleased that we have scheduled these hearings today on the role of business incentives for renewable energy technologies. Our Subcommittee has heard many times about the promising commercial applications of solar and other renewable energy technologies. I think that it is important for our Subcommittee to make sure that the fruits of our energy R&D programs do indeed reach the marketplace.

Our energy situation is certainly much brighter than it has been in the past. Recent trends in conservation and oil imports have been quite encouraging. It is gratifying to see that we are now importing almost 44 percent less oil than we did during the high point of 1978.

But I hope that we will not be lulled into a false sense of complacency by our current energy situation. In Sunday's New York Times Dan Yergin of Harvard again pointed out what the drastic consequences would be if we faced a third energy crisis. While conservation has been important, there are strong indications that current economic conditions have also been responsible for our reduced oil demand. And as my colleagues are fully aware, future economic conditions will be very difficult to predict.

This situation makes it imperative that we press forward with the development of our renewable energy resources. The need for solar and other renewables is just as real today as it was in 1974, when the Federal Government finally embarked on the development of these promising resources.

Over the past several months, our Subcommittee has heard a great deal of testimony on the future of the renewable energy industry. By and large, many of our witnesses strongly recommended tax incentives as the most effective means to stimulate the development of new energy technologies. Without the present tax credits, and even extended credits, they indicated that promising technologies such as wind, solar photovoltaics and others would not obtain the market support they need to tap their potential. This is certainly disturbing, and I hope that our Subcommittee can explore this question in more detail.

I am extremely pleased to have our eminently qualified witnesses with us today. Their insights will be valuable as our Subcommittee continues to look at the most fiscally responsible ways to help our Nation prepare for our energy future.

Thank you again, Mr. Chairman, for allowing me to make these remarks, and I look forward to a most productive morning.

Mr. FUQUA. Thank you, Mr. Fish.

Without objection, permission is granted to take photographs in the committee room retroactively.

Our first panel of witnesses, Robert Danziger from Sunlaw Energy, Inc.; John Wilson, with the Renewable Energy Institute, accompanied by Lee Goodwin; Dr. Edward Blum, vice president and executive director of the Alternative Fuels Group, Merrill Lynch White Weld Capital Markets; and Philip Huyck, of the First Boston Corp. in New York City.

Mr. Danziger.

STATEMENTS OF ROBERT DANZIGER, SUNLAW ENERGY, INC., SHERMAN OAKS, CALIF., JOHN WILSON, RENEWABLE ENERGY INSTITUTE, ACCOMPANIED BY LEE GOODWIN, PATTON, BOGGS & BLOW, EDWARD BLUM, VICE PRESIDENT AND EXECUTIVE DIRECTOR, ALTERNATIVE FUELS GROUPS, MERRILL LYNCH WHITE WELD CAPITAL MARKETS, AND PHILIP HUYCK, FIRST BOSTON CORP., NEW YORK

Mr. DANZIGER. Thank you, Mr. Chairman, and members of the committee, members of the staff, and friends. I share your view on the importance of this hearing and I am very, very pleased and proud to have the opportunity to speak before you today.

I have had the opportunity in the past to implement some of the actions of this committee and have been often impressed by the tenacity of the staff in executing the plans that you have set forth.

Our perspective is a private sector perspective. My company, Sunlaw, is involved in almost 2,000 megawatts of renewable energy projects and a couple thousand more of conventional cogeneration.

All of those projects are privately funded, privately developed, for the purpose of making a profit.

None of the projects have any Federal funds in them at all and no Federal subsidies save the tax credits.

My personal perspective is that ultimately the market must control the fate of renewable energy resources. However, I do believe that it is extremely important that we give renewable energy, particularly renewable energy electrical generation technologies, a chance to make a contribution to our energy requirements sometime in the century and, if possible, a significant measure in this decade.

It has been my experience that the tax credits are the door opener that gets the investor listening, gets the company promoting thus acting as a very, very significant tool in promotion of these projects far apart from their economic values.

We have come to the conclusion, as a result of our work, that the energy tax credit will have to be extended and in addition, those projects that have made affirmative commitments to their completion must be allowed the tax credit even if the credit would otherwise expire, as the current credit is scheduled to expire in 1985.

Many, many of the projects that we are involved in today have 5-, 6-, 7-, 8-year leadtimes. That is for the first project.

The first project is not making an industry; it does not allow the manufacturers we represent to build the production factories that are going to get the costs down, not just for the big projects we are involved in, but for all projects of any size.

Because of that, because there are such uncertainties in terms of timing and construction and because big energy projects face delay as a matter of course, it is very, very important that the learning value of these initial projects and the experience of building them not be lost in a rush to meet a particular deadline.

Time must be used with great care in order to bring renewables on within the next 15 years.

Indeed, I have good reason to believe that at least 7,000 megawatts of renewable energy projects will be canceled if the energy tax credit is not both extended and projects that are affir-

matively committed to allowed the credit as a part of the program to foster renewable energy resources in the United States.

In my view, the next 5 to 8 years is the immediate future. This is the timeframe we must deal in to get capacity resources for utilities, 5- to 8-year leads.

The current credit is scheduled to expire in 1985, with no affirmative commitments provision as there are for the specially defined energy-alternate credit and the other credits expiring at the end of this year.

It is significant to note that this 7,000 megawatts of renewable energy production, combined with the many thousands of conventional megawatts of cogeneration are likely, in my view, to completely back out baseload oil generation from the utility network within the next 5 to 8 years.

This is an extraordinarily significant event in the history of electric generation in the United States.

It will effectively take the majority of new additions of capacity out of the hands of the public utility industry and put it in the private sector. I believe that this committee has made a significant role in what amounts to a trend to deregulation of the generation of electricity. This is a part of that trend.

The other point I would like to make is that I had the opportunity, prior to starting Sun, law to be chief counsel to the energy programs at JPL, which is a magnificent institution of extraordinary integrity.

I learned a little about technology development there which is maybe a little hard to do for a lawyer. I had 167 engineers pounding on my head, don't screw up my programs, Danziger, and so on.

I truly believe, based on both my experience at JPL and also having been in the private sector, that photovoltaics as well point focusing dishes and other renewable technologies can make a contribution to our energy picture at least by the mid-1990's, but only if there is an energy tax credit available in the late 1980's.

Two reasons are involved here, one, I don't believe that companies will invest the massive resources necessary to bring the cost of long-term technologies down just in terms of the R&D funds required unless they see some reasonable basis for a market in the out years.

In addition, as I was saying before, the energy tax credit has served as a signal to industry that the United States, as a matter of policy, favors a clean energy industry and if that signal were to be removed, I believe that making research funds internally, will suffer significantly.

In my view, the decisions are being made right now, and I would say the vast majority of the big investment decisions necessary to get renewables on in this century will have to be made in the next 12 months.

Therefore, I congratulate the members on their timely introduction of the extension of the tax credits. I do believe it is important that Congress act by the middle of next year in order to assure a renewable energy industry in this century.

One thing that impresses me about tax credits, having come from an R&D background, is that while R&D does acquire knowledge, tax credits get hardware in the field, tax credits get energy

produced from renewable resources, they accomplish the task of helping the United States to reduce our dependency on both foreign sources of energy and certain heavily polluting sources of energy.

I think the point that Congressman Fish made about the role of manufacturers in getting these projects built, projects that are very, very expensive, is true.

A lot of the projects being built today are not economic. They are projects that in all likelihood will lose some money. But I think it is marvelous that manufacturers are finally biting the bullet, subsidizing these first projects to get their factories built, to get production rates up in order to get prices down.

Granted, if this first project is the only one they do, they will lose money, and also granted that if the industry takes off, they are superbly positioned, but I for one don't object to that.

I believe that industry is ready to put up or shut up. I believe that in working with this committee that we can foster a renewable energy future for our children that will improve the quality of life for all of us and hopefully also the quantity of material wealth to be shared by all persons of these great United States.

Thank you.

[The prepared statement of Mr. Danziger follows:]

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HEARING ON THE ROLE OF BUSINESS INCENTIVES AND DEVELOPMENT OF RENEWABLE ENERGY TECHNOLOGIES

Statement of Robert N. Danziger
President, Sunlaw Energy Corporation

To The

Energy Development and Application Subcommittee
Committee on Science and Technology
United States House of Representatives

Mr. Chairman, members of the committee, members of the staff, friends, I am pleased and proud to have the opportunity to address this subcommittee on subjects that will define in significant measure both the quality of life and the quantity of material wealth to be shared by this great country. I am also honored to speak before the members of this subcommittee whose actions I have had the opportunity to implement. I have often been impressed by the wisdom and tenacity of both the members and staff in guiding these United States and the Department of Energy to sound energy policy.

My work of the last few years has enabled me to gain some insight into just what this country's private sector is actually doing in the way of privately conceived, privately promoted, privately funded projects developed for the purpose of profit. Hopefully this insight will assist Congress in understanding the importance of extending the energy tax credit for renewable electrical generation technologies.

Sunlaw, my company, is principally involved in large electrical generation projects using alternate technologies. Projects are generally at least $25 million in capital cost and greater than 10 megawatts in capacity.

The average project we are involved in is around 50 megawatts. In addition, Sunlaw acts as consultants to several very large companies that are engaged in diversification into the renewable energy field.

Sunlaw's principal consulting activity is power sales agreement negotiation for cogeneration and small power production. To date, we have completed negotiation on some 260 megawatts of cogeneration and small power production, are in the process of negotiating some 860 megawatts more and have been retained to negotiate power sales contracts for an additional 1,000 megawatts sometime within the next year or so. Most of the projects are in California although we are involved in a smattering of projects all around the country.

Tax and financial considerations are an integral part of these 2,000 megawatts of alternative energy projects. Thus, tax and financial consulting is often provided by my company as an outgrowth of our activities.

I would like to emphasize that the projects that we are directly involved in use no federal or state funding whatsoever. To date, Sunlaw has not received one federal or state dollar to either assist Sunlaw directly or to subsidize our projects except through tax credits.

GOAL OF GOVERNMENT INCENTIVES

The goal of the renewable electrical generation industry is to develop projects that are less costly than the most expensive, least efficient utility plants. The fundamental question then is what utility generation is the most expensive now, and what will it be in the future? The question for this subcommittee, however, is how can we reduce the cost of well-defined renewable energy technologies to the point where they can be competitive without subsidy against expensive utility generation facilities?

Solar, wind and other renewable energy programs have focused on competing primarily with oil-based generation and to a secondary extent natural

gas-based electrical generation. This is because oil is an extremely expensive commodity and generally represents the most expensive energy produced by utilities.

However, we are seeing in oil-based utility districts an extraordinary explosion of cogeneration and small power production. The utilities are replacing oil and gas based generation by developing nuclear, hydro, and coal facilities. There is a high likelihood that oil-based generation will be largely backed out of the utility generation mix for purposes of displacement by alternative energy sources within five or six years. Even though some oil will still be burned, it will be burned intermittently, and coal will become the commodity that renewables must be cheaper than to be profitable. Evolving energy technologies will have to compete with coal-based generation in an unsubsidized environment in the longrun. An industry based on displacement of oil will be short-lived.

Therefore, it is important that the research, development and demonstration funding such as that arising out of the Solar Photovoltaic Energy Research, Development and Demonstration Act be continued to the maximum extent that these troubled economic times can allow. In addition, the role of the tax credit in fostering technology development must be supported.

EFFECTIVENESS OF CURRENT INCENTIVES

The two basic incentives employed today for renewable energy development are the energy tax credits and research, development and demonstration funding through the Department of Energy. The research and development tax credits have been of almost no effect thus far.

The Department of Energy programs have unfortunately seen a tremendous amount of waste. This is due to some lack of talent within the Department of Energy, some bad timing, and some fundamental problems in government-sponsored commercialization programs that principally result from industry

being unable and unwilling to share confidential data with government program managers.

Research, development and demonstration programs will only be successful if knowledge, when acquired, is translated to the private sector. The Department of Energy is not a manufacturer, it's not a developer, it's not a promoter. The Department of Energy programs can only establish feasibility, methodology and concept.

Research, development and demonstration programs cannot in and of themselves make an industry.

The challenge is enormous. In my experience, of all the national laboratories and other contractors, only the Jet Propulsion Laboratory, particularly in its stewardship of the United States Photovoltaics Program, has the integrity and talent to do the job right.

ADVANTAGES OF ENERGY TAX CREDITS

Tax credits have two spectacular advantages over research, development and demonstration programs: Tax credits put hardware in the field and knowledge in the private sector.

Energy tax credits get energy produced from renewable resources. Energy tax credits make private sector people put up private sector dollars at private sector risk to foster a renewable energy future. Tax credits take dollars out of the pockets of OPEC and put them in the pockets of entrepreneurial America.

Tax credits have also played a role in technology development. The credits have in fact been a signal to industry that as a matter of policy, the United States favors development of renewable energy in the future and therefore the investment of time and money in these early unprofitable years is a worthy gamble.

A number of the projects being sponsored today are not economic projects, even with the tax credit. These are projects that do not provide an adequate return on investment and may even lose money. The projects are promoted by hardware manufacturers who have finally decided to get something out in the field. These manufacturers know that factory production rates must go up in order to start the industry moving.

Many manufacturers have recently decided to bite the bullet by subsidizing first-of-a-kind projects. There is not to my knowledge windfall profits being made from these large projects that have been getting a lot of publicity recently. Indeed, in my experience, the hardware manufacturers are going to lose considerable amounts of money on these first projects but only if they are the only projects built. If the market takes off, these manufacturers are superbly positioned.

NEED TO EXTEND THE ENERGY TAX CREDITS FOR BUSINESS

The energy tax credits must be extended to get the first few commercial-scale energy generation facilities built, and to encourage the development of other technologies that promise significant cost reduction.

We can now conservatively project that certain technologies will be profitable with energy tax credits. These include the 100 megawatt solar central receiver projects, medium wind systems, and some other technologies in isolated circumstances.

<u>The current energy tax credit is not applicable to the 100 megawatt solar central receiver projects</u>.

At least two years is needed to build the factory that produces the main component, heliostats, and then at least four years is needed to complete construction of the <u>first</u> 100 megawatt project. The earliest possible completion date is 1988. The current energy tax credit is scheduled to

expire in 1985. And unlike the Alternative Energy Property Credit, Cogeneration Credit, and Specially-Defined Energy Property Credit, there is no provision to grandfather projects begun before 1985 but not scheduled for completion until sometime thereafter.

Therefore, some change in the law is required to see solar central receivers and others similarly positioned to make a contribution at all. Failure to extend the credit will cause the termination of over 7,000 megawatts of planned renewable resources.

Furthermore, two points must be stressed. The first is that delay is a fact of life in large energy projects. The second is that so many of these plants will be first-of-a-kind so that it is imperative that the learning value of these projects be maximized and the efficiency with which they are built be very high so that we do not build a bunch of renewable energy memorial turkeys. Time must be used wisely in order to build our industry properly.

No matter what the extension date that this committee recommends, or what expiration date is ultimately enacted into law, it is essential that the "grandfathering" of existing projects be allowed for those projects that have made "affirmative commitments" to actually complete the projects. Another reason for "grandfathering" is that renewable energy projects that can make a big contribution to our energy picture such as solar central receivers must as a practical matter be employed in a series of projects. This is because at least 100 megawatts per year in new starts, new orders, new construction is needed to allow for manufacturers to recoup their investment in high-rate and low-cost production factories.

Extending the credits is not simply a question of promoting renewable technologies to benefit big projects and big actors. If the big projects do not get built, prices are not going to come down for the little projects either. No size, no shape, no form of renewable energy industry will develop unless high-rate, low-cost production may be profitably employed.

The credits must be extended and grandfathered. Extension and grandfathering is essential to see renewable energy developed in this century. Fortunately, or unfortunately the signal from Congress as to extension and grandfathering must come very soon.

I believe that industry is ready to put up or shut up for long lead time technologies that promise to be profitable without subsidy after the first series of projects.

APPROPRIATE LEVEL OF ENERGY TAX CREDIT NECESSARY TO ENSURE SUCCESS OF A RENEWABLE RESOURCE INDUSTRY

In my opinion, the policy of the United States should not be stimulation of the market by creating windfall profits to project developers. In other words, once all tax benefits are accounted for, some substantial portion of the return to investors must come from the energy production associated with the technology. After all, if systems are free after taxes, there is no incentive for hardware designers to reduce cost but only to increase reliability to a level at least sufficient to satisfy tax requirements.

The appropriate level of energy tax credit necessary to ensure development of a renewable resource industry is essentially a crystal ball question.

Experience has shown that the 15% tax credit is working just fine. Even the 10% energy tax credit provided in the Energy Tax Act of 1978 had a positive effect.

The 15% credit does give renewable resources prestige that it requires relative to the other technologies that get somewhat smaller tax credits. The 15% tax credit does not, however, nearly compensate for the deductibility of oil and gas expenditures in conventional plants.

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I remember reading during my academic work that companies look at non-process related investment with a very jaundiced eye. I was told that these companies require a very high return on such investments, and even then may not choose to invest.

I am in the private sector now and it's true. Companies do look at non-process related investment with great skepticism. For example, in one instance a 50% internal rate of return on an eight-month payback period was ignored by a company because they were in the business of making paper and not in the business of making energy. For these companies, a 100% tax credit would not be effective.

What the energy tax credit in fact does is get the door open to allow a project promoter the time to try to sell and deal to an otherwise uninterested institutional investor. If the deal is sufficiently sound and the investors' criteria are met in a reasonably conservative economic scenario, the project needn't have a 50% rate of return. Indeed, I have seen where 50% rates of return simply were not believed because they seemed too good to be true.

If the energy tax credit was not available, however, in my opinion, the institutional investors would simply not be listening because the projects are too far outside of their area. They just wouldn't spend the time to understand the deal.

The energy tax credit for them also acts as a risk premium simply for the uncertainty and extra level of study required to invest in one of these projects.

WHEN TO TERMINATE THE CREDIT

If the credit is terminated as current law contemplates, a little bit of some of the renewable technologies will be fielded. Major projects will not be completed until after the credit expires. Photovoltaics, troughs, and many of the other technologies that are still in the development stage

need the tax credit to be around at the time that these technologies mature. We must give energy technologies time to reach a price point where they will be competitive without the tax credit. With the cutback in DOE funds, the principal tool available to promote renewable energy research and production is extension of the tax credit. It is extremely important that the tax credit be allowed to extend until at least 1990 in order to accommodate the technologies that are currently being invested in by industry. Even in 1990, however, grandfathering of existing projects through a requirement that they have made certain affirmative commitments towards completion of the project must be an essential component of any tax incentive program.

ABUSE OF THE EXISTING TAX CREDIT

Crossing my desk over the last few years has been at least a half a dozen projects that I would have to consider "tax shams." These are projects where the value of the energy tax credit is the only real value in the entire project. However, I have followed all of them closely and none of them attracted significant investment and thus died of their own weight.

There are two reasons for these tax shelters' failure to succeed. On the smaller projects, where individual investors were sought, legitimate application of "at risk" rules that require investors to be liable on loan costs have effectively eliminated the saleability and legitimacy of the tax shelter schemes advocated by shady entrepreneurs. As to the $20, $30, $100 million projects, there are so many law firms involved, so many tax opinions, so many required Internal Revenue Service rulings that promoters must play it straight.

Sunlaw is involved in several solar projects in the $100 million plus range. These projects have costs that in the aggregate are equivalent to the five nuclear power plants of the Washington Public Power Supply System (WPSS), the failure of which is staggering dozens of utilities. Aerospace, even big oil, leg alone electronics and chemical companies

cannot afford a financial debacle of WPSS magnitude. The deal has to be doable in a conservative sense or the exposure is simply too great for the private sector. Thus there is a great disincentive to try and cheat because of the in-depth corporate and financial community scrutiny of these projects.

CONCLUSION

Renewable resources must be viewed as a component of our national security, our national honor, and our national ambition to provide a comfortable and prosperous world for our children. This committee, its staff and the concern of the people I represent suggest that renewable resources will play their role sometime. The question to be put to Congress in the coming months is when will a renewable future occur? Will it be in this century? If so we must act now. OPEC must not make the decision for us. The United States, through your leadership, must maintain its moral and technical promotion of what I believe we all here know to be goodness. Where we go from here will be a function of the teamwork offered by this subcommittee and the ambition of a vibrant, dedicated, inspired private sector.

Thank you for your time.

SUNLAW

Sunlaw Energy Corporation
[illegible]
Sherman Oaks [illegible]
Telephone 2[illegible]

ROBERT N. DANZIGER/PRESIDENT

Career Experience

Robert Danziger brings to Sunlaw unique legal, regulatory, financial and legislative experience in energy matters. Starting with authorship of law review articles on cogeneration and solar in 1975, Mr. Danziger is a recognized expert in the practical, institutional and academic aspect of emerging energy technologies.

While serving as Chief Legal Counsel and Institutional Analyst for Jet Propulsion Laboratory's energy program, Mr. Danziger represented the interests of cogeneration, photovoltaics, solar thermal electric, geothermal, biomass, synfuels and coal to the Department of Energy, Federal Energy Regulatory Commission, Congress, Office of Management and Budget, Justice Department, state energy and public utility commissions, industry and others.

Mr. Danziger has written a book on Sections 201 and 210 of the Public Utility Regulatory Policies Act, and served as an expert witness for Kerr-McGee Chemical Corporation on the California Cogeneration National Gas Incentive Rate case.

Other activities include extensive consultation in energy taxation, utility law, and technological ramifications of statutory impositions.

Academic and Professional Background

Robert Danziger has a Juris Doctor from Whittier College School of Law where he is now an Adjunct Professor teaching the Law of Emerging Energy Technologies. He is a member of the International Cogeneration Society, International Solar Energy Society, Audobon Society, Town Hall, California Solar Energy Industries Association, California Bar Association, Los Angeles County Bar Association, and Los Angeles Chamber of Commerce. He has authored over 20 publications in the areas of cogeneration, energy financing, the National Energy Act, and energy taxation.

Mr. FUQUA. Thank you very much, Mr. Danzinger.

Mr. Wilson.

Mr. WILSON. Thank you, Mr. Chairman. I want to thank you for the opportunity to appear before you and apologize for the last minute substitution.

My chairman, Jack Conway, who was scheduled to appear, is also the vice chairman of a photovoltaics development firm, He has been busy helping that firm develop its staff in Troy, Mich. His absence is sorely missed by us.

Appearing with me is Lee Goodwin, an attorney who directs our tax policy project. Lee has helped us develop a series of studies about the effect of different tax incentives on renewable energy development.

We recently released a report and Lee will give you some of the technical points of how the incentives work and what makes tax credits so much better than the incentives in the Economic Recovery Tax Act.

I am here basically to give you an overview and to clarify a couple of points that we felt were important today.

First is that among all the programs that one could consider for moving renewable energy technologies, there is no single initiative that this Congress has taken that has meant more than the passage of the energy tax credits and the extension of those credits in 1980.

They are virtually always cited by firms as important in their internal decisions. When you look at how firms analyze a decision to move forward with a particular technology, you always see the tax credits on every one of those analysis sheets.

Some of the information I have provided with my testimony today includes analyses by Martin Marietta Corp. of a proposed solar thermal plant that Southern California Edison desires to have built in its service territory.

We have provided information from another company about a theoretical solar utility project that involves hot water heating for industry. This theoretical project is backed up with a press release by the company, announcing a $1.3 million deal last week involving just such technology.

We are particularly aware of the timing of your efforts to look at the tax credits, especially in light of the administration's continued efforts to repeal the existing credits that expire in 1985.

In fact, last week, as recently as last Friday, Treasury Assistant Secretary John Chapoton gave a speech before the American Bar Association Energy Committee in which he refused twice to say the credits could be considered safe from administration repeal.

I don't know why they continually come after them. In fact, we spent a little time this past week trying to analyze the numbers to find out if it is the revenue loss, the size of money working in this budget climate that seems to make their attempts so persistent. But, in fact, numbers I obtained yesterday from Treasury and from the Joint Committee on Taxation, which I have provided here, demonstrate that the Treasury loss for these credits has been small, smaller than what Treasury or the administration under the Carter administration predicted for the use of these credits. I suspect much smaller, really, than most of us would imagine today.

There are several reasons for this, the economy has dropped considerably, the price of energy has plummeted, there is an "oil glut" on the market.

Then you have the administration's shift with respect to renewable energy. On top of that, you have the administration continually coming after the credits, making financial markets very wary of entering deals based upon or depending on these credits for that little margin of push to turn the program economically sound.

That margin is what you need to focus on since you are interested in pulling new technology into the marketplace.

What you are seeing today are the results of decisions made several years ago, decisions to gear up, produce, and put into the field technology that you helped sponsor through years of Government research.

If the credits are not extended, what you will see is a market frozen with that kind of technology and that kind of economics and some improvements. Private industry does a great deal, but the tax system of this country does a great deal to assist private industry in making its decisions with new innovations.

I think Bob pointed out that the quantity of money that the individual corporations have put into renewable energy developments is staggering. You see a lot of companies moving ahead with major projects, particularly with utilities. The combination of the new negotiating postures and some of the economics of peaking fuels have combined to help the projects move several years ahead of what we would have thought possible.

California is amazing, with the wind development going on—cogeneration, hydro, solar, photovoltaics, the whole range of renewable technologies is being pulled into the marketplace by these credits.

What we are most concerned about is the fact that the tax credits end in 1985. On December 31, 1985, you either have it or you don't. On January 1, they are gone.

There is precedent in the Tax Code that when you enact a short-term tax incentive program, you can provide some form of affirmative commitments rule so that planners who can't quite get their project fully out the door can be assured of acquiring some percentage of the credits for those expenditures planned before that cutoff.

I would urge that you consider, as you move to extend the credit, putting some affirmative commitments ledge beyond that.

There is a hydro program which has it, extended from 1986 to 1988. I would recommend, if you consider a 5-year extension, which is what we think probably needs to be done, that you consider a 3-year affirmative commitments ledge beyond that.

A couple other points I would like to touch on very briefly. One is that several people have raised issues of the cost of these credits to the Treasury. There are a number of analyses floating around on that.

I am here to tell you that virtually any economic analysis trying to predict the effect on Treasury of any particular tax incentive is basically flawed because it is very difficult to predict all of the economic parameters and know exactly how much will go in and come out as a result of the incentive.

So the numbers that you see being pushed around, whether from the Brookhaven, Arthur D. Little, or any other study that is pointed to, you have to look at the assumptions very carefully.

We worked most of the day yesterday trying to come up with good numbers on this. I think you will find the numbers in the first few years are certainly in the low millions.

In fact, the expenditures in 1980 are expected by Treasury to be less than $10 million. It is a very low number in comparison to the hundreds of millions they had predicted.

I recommend that you work very closely with the Ways and Means Committee and the Joint Committee on Taxation staff to get a better handle on the numbers and you may find they fit closer within the budget parameters that you are working with.

[The prepared statement of Mr. Wilson follows:]

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TESTIMONY OF

JOHN W. WILSON

EXECUTIVE DIRECTOR

RENEWABLE ENERGY INSTITUTE

ON ENERGY INVESTMENT TAX CREDITS

BEFORE THE SUBCOMMITTEE ON

ENERGY DEVELOPMENT AND APPLICATIONS

OF THE

HOUSE SCIENCE AND TECHNOLOGY COMMITTEE

TUESDAY, JULY 13, 1982

Chairman Fuqua, members of the subcommittee. My name is John Wilson and I am the Executive Director of the Renewable Energy Institute. I wish to thank you for the opportunity to appear today before you. The Institute's Chairman, Jack Conway, regrets that he is unable to be here and present this testimony himself. As you may be aware, he is also the vice-chairman of a photovoltaic firm based in Troy, Michigan. He and I both regret that this relationship necessitates his absence from Washington today, but we hope that the testimony that I will provide will meet your needs.

The Renewable Energy Institute is a non-profit research organization focusing on renewable energy technologies and the role they can play in helping this nation move toward a sustainable energy strategy for the decade ahead. I was very pleased to learn that the subcommittee had decided to go forward with hearings on this critical issue, because I consider the quality hearing record that this subcommittee will develop as a critical element for a wise decision by this Congress on the future of tax incentives for renewable energy development.

With me today is Lee Goodwin, a tax attorney who specializes in alternative energy matters, who serves as the director of the Institute's Tax Policy Project. Mr. Goodwin authored the report which the Institute is releasing today relating to the value of the Economic Recovery Tax Act to renewable energy activities. While he will give you an in-depth discussion of various technical issues such as the research and development credit and depreciation

reform, I would like to share with you a little of the background and briefly touch on a couple of issues which you have indicated are uppermost in your deliberations.

When the business energy tax credits were enacted into law Congress, and indeed the nation, had a very clear set of signals about the importance of energy policy. The 1973 oil embargo led to an ever increasing energy price spiral and severely reduced supply. This was at a time when America's consumption of energy was at an all-time high, prompting Congress to make several decisions relating to the importance of developing new sources of energy. The 10% business energy tax credit for investments in solar, wind, and ocean thermal energy equipment originally enacted in 1978 was expanded to 15% by the Crude Oil Windfall Profits Tax Act. As passed by the Senate, the credit was to have been 20% and was to have expired in December of 1990. During the conference treasury analysts, pointing to projected revenue shortfalls, convinced the Members of the conference to trim back the credit to 15% and the termination date to 1985.

The Tax Policy Project of the Renewable Energy Institute has been in the forefront of efforts over the past year and a half to demonstrate the value of these targeted incentives to a hostile Treasury Department. In the summer of 1981, we were successful in gaining Treasury's support for a special energy exemption from the "At-Risk" rules of the Economic Recovery Tax Act. This amendment passed the Senate by a unanimous recorded vote, was accepted in conference, and was signed into law by President Reagan.

No sooner had the dust settled from this threat when we obtained information indicating that Treasury was moving toward a proposal to repeal all energy credits by December of 1982. Even thougt both Houses of Congress and both tax writing comittees have formally expressed their displeasure at this proposal, Treasury Assistant Secretary John Chapoton has refused, as recently as last Friday, to say that the credits are safe from attack. In fact, Chapoton told an American Bar Association Energy Committee meeting that he could not say that the credits were safe and that the issue was still under study. Chapoton commented on the poor politics involved with this issue by relating that Finance Committee Chairman Dole, upon learning of the proposal last fall, informed the Assistant Secretary that he was dedicating a new alcohol fuels plant in his state during the following week and that the proposal was clearly an untimely one.

We also are very familiar with these proposals from the large number of calls we have received from Wall Street brokers every time the Administration's efforts have surfaced. These have usually been frantic inquiries about the reasons for the Administration's attitudes and the all-important effective dates for the Administration's proposal. These calls did not come from uninterested bystanders, but rather from brokers and analysts who are in the middle of significant renewable energy project efforts, sometimes involving hundreds of millions of dollars, only to learn that their government is about to pull the rug out from under them.

Thus we applaud the efforts of this committee to try to come to grips with the true value of energy tax credits and to anticipate the need for extending the credits in the near future.

I am here to say that no action that Congress has yet taken has been more important in furthering the development of a healthy, competitive renewable energy industry than the enactment of the energy investment tax credits.

The energy tax credit for renewable energy technologies is an efficient, sure-fire way to stimulate capital expenditures. There has never been any debate from Treasury about the value of energy tax credits or their efficiency. To question these credits, one would have to question the value of the standard investment tax credit, which would be similar to questioning the value of depreciation. In fact it is this Administration which created the concept of safe harbor leasing in order to equally distribute the benefits of investment tax credits to all companies, whether or not they have a tax liability sufficient to take advantage of this incentive. Their strong support of safe harbor leasing is based on the realization that tax credits weigh heavily in decisions of business leaders to invest capital. In fact, as some of the attachments to our testimony today indicate, the renewable energy tax credits are always taken into account by analysts before advising management or investors on prospective renewable energy projects.

Hardly a week goes by when a major broker or major company doesn't interview someone at my organization about the future viability of the energy tax credits. These decision makers are facing major choices about whether or not to gear up to produce a renewable energy technology that is leaving the laboratory and entering the marketplace, or whether or not to become involved as an investor in one of the new, exciting projects that result directly from the work of this committee.

Investment tax credits can only be taken for property which is placed "in service". Thus, Treasury expenditures for tax credits occur after private investment has taken place, equipment has been ordered, employment created, and taxes paid. All too often in the discussion about revenue loss, tax credits fall victim to the fact that Treasury does not take into account revenue generation when it calculates revenue loss for various tax programs. Several independent analyses have been conducted to try to determine the value of energy tax incentives in stimulating investment. Unfortunately, any study of this kind must have some speculation about the amount of incremental investment caused by a given tax incentive. However, an analysis by the Arthur D. Little Company for the Lawrence Livermore Laboratory which examined business energy tax credits for solar thermal and wind energy equipment concluded that "the cost of tax credits to the Treasury is amply repaid to the nation by the value of the energy saved."

This analysis is based on calculations of the reduced deductions for fuel costs by purchasers of renewable energy equipment as well as the increased profitability of those firms which forego these monthly fuel bills.

The Arthur D. Little report leads directly to our response to one of the major questions posed by your hearing: What would be the cost to the Treasury of extending the credits to the year 1990?

An attachment to our testimony (Appendix I) provides an example of different estimates of that have been made over the past few years. We hasten to point out that these numbers reflect the Energy Tax Credit cost only, and do not include additional revenue gained from the reduction in fuel expensing, or from increased profitability, or from wages paid by firms which convert to renewable energy systems.

As you see from the chart, the past estimates have run far in excess of those credits that were actually claimed, and it is likely that tax credits claimed from 1986 through 1990 would fall below most of the earlier predictions. It is very interesting to note that Treasury has significantly reduced its internal estimates of revenue outlays, yet they are still discussing early repeal.

Whatever the total amount of the one-way flow of the credit, the additional economic activity and the reduced tax loss from fuel expensing would be considerable, even without taking into account any improvement in our national security posture by reduced dependency on imported fuels. I need not remind this Committee of the cost nor the technical difficulty of storing large amounts of petroleum and the technical advantages of producing energy in dispersed systems close to the source of energy use.

The 1990 termination date is logical for consideration for several reasons. First, it was the date that Congress initially intended to use for the duration of the energy tax credits, and it is the date that most planners have focused on as a reasonable time period over which to gear up a new industry. Secondly, it is just beyond the current planning horizon for most companies, while the current 1985 deadline has already been overtaken and

indeed passed by most corporate plans. Thus, to influence decisions that are being made today, any incentive must deal with the time period from 1985 to 1990. Otherwise, we will not be influencing new decisions, but rather rewarding commitments that were made over the past few years.

These decisions have, indeed, been rather significant as we have seen a number of major renewable energy projects come into the marketplace. Virtually every major renewable energy firm that one can think of has moved a project off the drawing boards and into the financial community in the last three to four years. Wind farms have moved from a conceptual discussion to a real, exciting development in the mountain passes in California. One utility alone holds twelve major contracts for power production from windfarms, solar-thermal and photovoltaic systems. The achievement of the turbine roll at Barstow has even been surpassed by Southern California Edison's interest in constructing a 100 Megawatt central receiver facility.

Indeed, Southern California Edison has indicated that they may be willing to build more than one solar thermal plant if adequate proposals and sufficient land are available. Appendix II is a schematic representation of the effect of the Energy Tax Credit upon one such project, information provided for us by Martin Marietta Corportation. While only estimates, one must remember that Martin Marietta is currently bidding against other contractors to provide equipment for Southern California Edison's solar thermal project. The effect of the credit is quite clear: With the credit you can do the project now, at today's energy prices. Without it, you will have to wait until the price of energy is carried up by the whims of OPEC.

Similarly, American Solar King has provided us with information (Appendix III) about third party financing of industrial solar energy systems, demonstrating quite clearly that the rate of return without the Energy Tax Credit is insufficient to attract investors at a time when interest rates are relatively high and low-risk investments secure returns that are comparable to riskier renewable energy investments. Here the effect of the credit is equally clear, in that American Solar King last week announced a $1.3 Million project at a major veal feeding and processing plant in Wisconsin (Appendix IV). The importance of the energy tax credits to these deals is not solely by our analysis, but rather by the repeated expressions of concern by each and every one of these companies. In fact, in an industry that is often divided over the value of various research, development, demonstration and commercialization programs, the renewable energy industry is remarkably united in its support of tax incentives and specifically the Business Energy Investment Tax Credits.

In answer to your question regarding the appropriate level for the Energy Investment Tax Credit, I would point again to the analysis provided by the Arthur D. Little study. If one realizes that, by increasing the level of the Energy Tax Credit, one moves increasing numbers of marginal projects into the realm of the possible, then it is easy to see why the increased economic activity and the reduced level of expensed fuel cost could justify increasing the percentage of the energy tax credit. Of more importance, however, is the need to extend the life of the credit at its current level for five more years, thus ensuring a smooth economic climate in which to plan and develop these projects.

99-651 O—82——3

I should note here that the Administration's constant assaults on the energy tax credits have severely damaged the viability of proposed projects, even though the economics of the projects were sound. This is because Wall Street views Administration attacks on various tax provisions as tantamount to their actual repeal. I cannot tell you how many times we have received calls from major investment banking firms seeking the latest news in the battle of energy tax credits versus the Administration. In fact, extending the energy investment tax credits for renewable energy would do a great deal to ease the mind of investors that these incentives are going to stay in place long enough for them to recoup their investments and indeed turn a profit. Similarly utilities, insurance firms, and corporations investing in plant and capital equipment could see their way clear to become involved in major renewable energy projects that may not be constructed for several years to come. It is interesting to note that the energy investment tax credit was given a life shorter than the period of time it currently takes to build a conventional power plant. As to the appropriate termination date for the extension of the Business Energy Investment Tax Credits, I would strongly encourage the Congress to extend these credits through 1990, with a carefully crafted affirmative commitments rule through 1993. One of the most unfortunate features of the existing credit is the fact that on December 1, 1985, the credit abruptly ends. Thus, unless you can get your project up and running by that time, you are out of the game. In most other short-term tax incentive programs, some transition rule is prepared for those projects

which are carefully planned and well along in their conception prior to the termination of the incentive period. What I have suggested here in the way of an affirmative commitments rule is not without precedent. The Hydropower Investment Tax Credit has an affirmative commitments rule, similar to the one I have suggested, extending from 1986 to 1988. To meet the requirements of this rule and to claim the energy tax credit for hydropower expenditures, one must have docketed an application for the project with the Federal Energy Regulatory Commission prior to January 1, 1986, and place the equipment in service before December 31, 1988.

A rule of this type rewards activity up until the very last minute of the credit's existence, while a credit that ends abruptly results in significant loss of activity in the last few years. This is because most companies cannot conceive, research, invest in, and construct new technology in less than the remaining three and one-half years of the Renewable Energy Business Tax Credits. If this committee is concerned with drawing new technology into the marketplace, it must provide a little more room for that technology to develop. This is not to say that the wind farms, solar-thermal plants, and photovoltaic systems that are going up in the next few years are not to be rewarded. They are the direct result of the credit's enactment in 1978 and expansion in 1980. But to pull the next generation of technology, or the next scale of systems into being we must have the credits extended. I think you will hear a great deal more about this from other companies, particularly Acurex, Arco, and Boeing, who will appear before you today.

I would like to make one more point here on the issue of the termination date that I think pertains directly to a technology that this committee has struggled with over the past few years. As you well know, the Administration recently awarded two design planning awards under the Ocean Thermal Energy Conversion Program. If this committee wants to see privately funded ocean thermal energy conversion plants producing American power, then you must convince Congress to extend the credits. For without extension, it is fairly certain that no plant will be completed before 1985.

Lastly I would like to touch on a couple of issues which relate to the importance of the energy tax credits for renewable energy development. A number of studies have been conducted over the past several years which tally the quantity of federal support for energy technology development and the production and use of various fuels. Whether one considers the Battelle Study figures or the ORBES figures, or any one of a number of studies, one comes quickly to grasp the historical significance of support for energy development in this country. Conventional energy technologies have benefited from massive federal support as well as major state regulatory and tax incentives. By all accounts, these subsidies exceed $200 Billion while support for renewable energy development represents only a bump on the log. The Administration, and the current shift in government philosophy, have quickly stifled our research and development programs, our commercialization activities, and our government purchases of these new technologies. The remaining program Congress enacted consists of energy tax credits. The Administration has proposed repeal of these, on the grounds that they are no

longer needed in the "energy free market" which has been created by the cancelling of all other programs. The firms which you have and will hear from today are strong proponents of a free market for energy, but they appear before you today in marked opposition to the Administration's proposed repeal of these credits. In fact, I know of no company currently involved in renewable energy development that would not strongly support an extension of the Renewable Energy Business Tax Credits until the year 1990.

Thus, I urge each and every one of the members of this committee to work very closely with their colleagues on the Ways and Means Committee to demonstrate the importance of this powerful tax policy mechanism and urge a five-year extension of the Renewable Energy Investment Tax Credits, with an appropriate affirmative commitments period to follow.

APPENDIX I

REVENUE ESTIMATES (IN MILLIONS OF DOLLARS)

ENERGY INVESTMENT TAX CREDITS FOR SOLAR AND WIND PROPERTY

	Calendar Years:											
Source:	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1978 Energy Tax Act-Conference Report (10% credit through 1985)	7	10	15	19	13	-	-	-	-	-	-	-
1980 Crude Oil Windfall Profits Tax Act-Senate Finance Committee Report #96-394 (20% credit through 1990)	-	30	57	94	221	344	449	495	548	605	669	739
1980 Crude Oil Windfall Profits Tax Act-Conference Report #96-817 (15% credit through 1985)	-	10	19	34	108	282	497	78	30	<5	-	-
Actual Treasury Returns (as of July, 1982)	8.9	<10	-	-	-	-	-	-	-	-	-	-
Revised Treasury Estimates (February, 1982)	-	-	-	18	23	23	22	16	-	-	-	-

APPENDIX II-1

MARTIN MARIETTA AEROSPACE

DENVER AEROSPACE
POST OFFICE BOX 179
DENVER, COLORADO 80201
TELEPHONE (303) 977-3000

July 6, 1982

Mr. John Wilson
Renewable Energy Institute
1050 17th Street N.W., Suite 1100
Washington, D.C. 20036

Dear John:

Enclosed please find some materials on our views of the importance of the 15% Energy Tax Credit to Solar Thermal Central Receiver Technology, and in particular the 100 MWe project currently in the works for Southern California.

The graph in the package is based on the costs and performance of that project; the projected energy price will probably be somewhere between 5.5-7.0 cents/kWh. At those rates, one can see the importance of the ETC--the difference between a viable and non-viable project from the investor's point of view. However, I am not sure that the chart is sufficiently self-explanatory for your pruposes, and you may want to leave it out.

I hope that these will be of some help, and if you have any questions or need any more materials, please don't hesitate to call me at (303) 977-0695. In any event, we will be looking forward to hearing the results of your testimony.

Very truly yours,

MARTIN MARIETTA AEROSPACE

John E. Montague
Solar Energy Systems
Financial Analysis

APPENDIX II-2

IMPORTANCE OF ENERGY TAX CREDITS TO SOLAR THERMAL CENTRAL RECEIVER (STCR) TECHNOLOGY

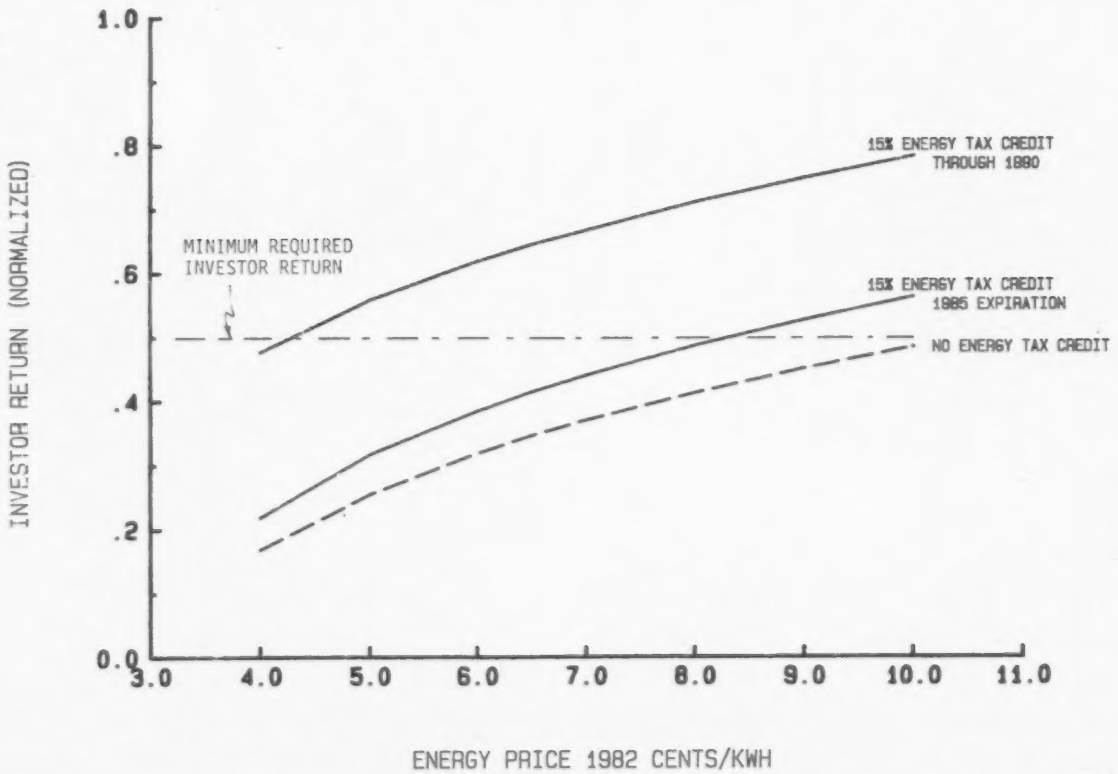
- STCR TECHNOLOGY IS RAPIDLY APPROACHING COMMERCIALIZATION. SEVERAL COMPANIES, INCLUDING MARTIN MARIETTA, ARE CURRENTLY DEVELOPING DESIGNS AND FINANCING FOR 100 MWe SOLAR CENTRAL RECEIVER PLANTS TO BE BUILT IN SOUTHERN CALIFORNIA.
  - $400-500 M investment per plant, operational in 1988
  - 10 times larger than DOE-funded Solar One at Barstow
  - Projects will prove commercial feasibility of the technology
- DUE TO CAPITAL INTENSIVE NATURE OF TECHNOLOGY, AND CAPITAL CONSTRAINTS OF UTILITIES, PROJECTS WILL BE FINANCED AND OWNED BY THIRD PARTIES WITH SALE OF ELECTRICITY TO AREA UTILITIES.
  - Investors must be compensated for risk involved with first large scale advanced technology plants.
- FEDERAL ENERGY TAX CREDITS ARE CRUCIAL TO ATTRACTING POTENTIAL INVESTORS.
  - First plants will not provide sufficient returns without tax credits due to high cost

JEM 7/6/82

MARTIN MARIETTA

ENERGY TAX CREDIT IMPACTS

APPENDIX II-3



JEM 7/2/82

APPENDIX II-4

SOLAR 100 PROJECT BENEFITS

- EACH PROJECT WILL PROVIDE $400-$500M IN FEDERAL TAX REVENUES OVER LIFETIME
  - Due to deduction of fuel costs, conventional power plant would generate 30-50% less federal revenue
- EACH PROJECT WILL DISPLACE OVER 500,000 BARRELS OF OIL ANNUALLY CURRENTLY BEING BURNED BY UTILITIES
- PROJECTS WILL PROVIDE COMMERCIAL VALIDATION OF NEW RENEWABLE RESOURCE SUITABLE FOR UTILITY USE
  - Culmination of Federal R&D investment over past 10 years
  - DOE projections are 0.5-1Q of STCR technology by year 2000
  - Investment in manufacturing facilities will enable realization of potential cost reductions
  - Help prevent loss of world lead in technology to foreign competition

JEM 7/2/82

MARTIN MARIETTA

JUN 18 [illegible]

APPENDIX III-1

Solar King®
AMERICAN SOLAR KING CORPORATION
7200 IMPERIAL DRIVE • P.O. DRAWER 7399 WACO, TEXAS 76710 (817) 776-3860
Telex #730916

BRIAN D. PARDO *PRESIDENT*

June 18, 1982

Mr. John W. Wilson
Executive Director
RENEWABLE ENERGY INSTITUTE
1050 17th Street, N.W., Ste. 1100
Washington DC 20036

Dear John,

Per our discussion, I am enclosing two analyses projecting return on investment for a major solar installation.

The projections vary in only one respect. One includes the Energy Tax Credit and the other does not. As you can see, the tax credit has a profound effect on internal rate of return. This, of course, was envisioned by Congress as a means of providing a competitive stance for solar energy in the investment banking community.

Normally, according to my account executive at Merrill Lynch, tax advantaged investments offered by that firm produce a 20-27% internal rate of return. As you can see, the analysis deleting the Energy Tax Credit produces a 20.68% return. This is at the minimum level of acceptability.

In reality, of course, most investments of this nature produce a mid range 23-24% return. Needless to say, we won't make it on a competitive basis unless we can do <u>better</u>, not just as well or not as well. In other words, solar energy is the "new kid on the block" in the investment banking community. In order to overcome skepticism and cautiousness, in fact, even to get a serious analysis started, the solar system has to be more attractive than conventional investments.

As you can see, the effect of the Energy Tax Credit produces just that result. The return goes to around 40%, which is interesting enough to get serious attention. Even then, don't get too excited. The 40%+ return <u>assumes</u> a good residual value to the system.

APPENDIX III-2

Residual value is hard to determine because we are projecting ten years into the future with capital equipment that is untested over very long terms. We, of course, are firmly convinced that the equipment will last well in excess of 20 years. This area remains, however, one of risk for the investor.

We believe that the existing Energy Tax Credit is sufficient to allow investor participation and, therefore, market adoption. We are worried, however, that the scheduled termination of the Energy Tax Credit in 1985 will not allow sufficient investor confidence to support industry tooling and serious market penetration.

As an example, our company currently has the capacity to produce about 100,000 solar collectors per year. Admittedly, this appears to be a large quantity. When you consider, however, that just 25 industrial systems would consume about 75,000 collectors (the remainder now go to the residential market) you can see quantum levels of expansion will be necessary. Expansion, of course, requires capital investment which must necessarily be recaptured over a long period of time.

If Energy Tax Credits terminate in 1985 we are concerned that the market would dry up or substantially diminish. Needless to say, this concern is very powerful and will, in fact, prevent the industry from tooling up for a meaningful market penetration.

We conclude that the single most important element for growth and success of the solar and renewable energy industries will be the continuation of the Energy Tax Credits, both for residential consumers and business.

I hope the information provided herein is of assistance to your effort. The financial analyses were prepared by the national accounting firm of Main Hurdman, our auditors, and the installation "ABC Corporation" is a real life installation for a textile mill in Virginia.

If I can be of further assistance please feel free to call upon me. Thanks.

Sincerely,

Brian D. Pardo
President

BDP/dh

Enclosures

APPENDIX III-3

AMERICAN SOLAR KING CORP.
INVESTOR OWNED FINANCIAL ANALYSIS
ABC CORPORATION
*** FOR INTERNAL USE ONLY ***

	YEAR #1	YEAR #2	YEAR #3	YEAR #4	YEAR #5	YEAR #6	YEAR #7	YEAR #8	YEAR #9	YEAR #10
ASSUMPTIONS										
SYSTEM PURCHASE PRICE	3328000	-	-	-	-	-	-	-	-	-
DOWN PAYMENT	1664000	-	-	-	-	-	-	-	-	-
NOTE	1664000	-	-	-	-	-	-	-	-	-
INTEREST RATE ON NOTE	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
RESIDUAL VALUE	-	-	-	-	-	-	-	-	-	2000000
INCREASE IN ENERGY COST	22.00	22.00	22.00	22.00	22.00	15.50	15.50	15.50	15.50	15.50
TOTAL ENERGY SAVINGS	220000	268400	327448	399487	487374	562916	650169	750945	867341	1001779
SALES PRICE / NAT. GAS	80	80	80	80	80	80	80	80	80	80
ACRS DEPRECIATION RATES	15	22	21	21	21	-	-	-	-	-
ASSUMED TAX RATE	50	50	50	50	50	50	50	50	50	50
INITIAL OUTFLOWS										
DOWN PAYMENT	1664000	-	-	-	-	-	-	-	-	-
INVESTMENT TAX CREDIT	-332800	-	-	-	-	-	-	-	-	-
ENERGY TAX CREDIT	-	-	-	-	-	-	-	-	-	-
NET CASH OUTFLOW	1331200	-	-	-	-	-	-	-	-	-
INCOME	176000	214720	261958	319589	389899	450333	520135	600756	693873	801423
MAINTENANCE	5000	5500	6050	6655	7321	8053	8858	9744	10718	11790
INSURANCE	6000	6600	7260	7986	8785	9663	10629	11692	12862	14148
INTEREST	166400	165440	160512	150367	133445	107800	73546	28888	-	-
DEPRECIATION	499200	732160	698880	698880	698880	-	-	-	-	-
TAXABLE INCOME	-500600	-694980	-610744	-544299	-458531	324818	427101	550432	670293	775486
TAX (TAX SAVINGS)	-250300	-347490	-305372	-272150	-229266	162409	213551	275216	335147	387743
NET CASH INFLOW	248900	334670	393508	426730	469614	162409	213551	275216	335147	2387743
CASH FLOW BEFORE PRIN. PY	-1082300	384670	393508	426730	469614	162409	213551	275216	335147	2387743
PRINCIPAL PAYMENT	9600	49280	101446	169222	256454	342533	446588	288876	-	-
NET CASH FLOW	-1091900	335390	292062	257509	213161	-180124	-233038	-13660	335147	2387743
BALANCE ON LOAN	1654400	1605120	1503674	1334452	1077998	735465	288876	-	-	-
INTERNAL RATE OF RETURN	20.68	-	-	-	-	-	-	-	-	-
DISCOUNTED CASH FLOWS	-	-	-	-	-	-	-	-	-	-

APPENDIX III-4

AMERICAN SOLAR KING CORP.
INVESTOR OWNED FINANCIAL ANALYSIS
ABC CORPORATION
FOR INTERNAL USE ONLY

	YEAR #1	YEAR #2	YEAR #3	YEAR #4	YEAR #5	YEAR #6	YEAR #7	YEAR #8	YEAR #9	YEAR #10
ASSUMPTIONS										
SYSTEM PURCHASE PRICE	3328000	-	-	-	-	-	-	-	-	
DOWN PAYMENT	1664000	-	-	-	-	-	-	-	-	-
NOTE	1664000	-	-	-	-	-	-	-	-	-
INTEREST RATE ON NOTE	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
RESIDUAL VALUE	-	-	-	-	-	-	-	-	-	2000000
INCREASE IN ENERGY COST	22.00	22.00	22.00	22.00	22.00	15.50	15.50	15.50	15.50	15.50
TOTAL ENERGY SAVINGS	220000	268400	327448	399487	487374	562916	650169	750945	867341	1001729
SALES PRICE / NAT. GAS	80	80	80	80	80	80	80	80	80	80
ACRS DEPRECIATION RATES	15	22	21	21	21	-	-	-	-	-
ASSUMED TAX RATE	50	50	50	50	50	50	50	50	50	50
INITIAL OUTFLOWS										
DOWN PAYMENT	1664000	-	-	-	-	-	-	-	-	-
INVESTMENT TAX CREDIT	-332800	-	-	-	-	-	-	-	-	-
ENERGY TAX CREDIT	-499200	-	-	-	-	-	-	-	-	-
NET CASH OUTFLOW	832000	-	-	-	-	-	-	-	-	-
INCOME	176000	214720	261958	319589	389899	450333	520135	600756	693873	801423
MAINTENANCE	5000	5500	6050	6655	7321	8053	8858	9744	10718	11790
INSURANCE	6000	6600	7260	7986	8785	9663	10629	11692	12862	14148
INTEREST	166400	165440	160512	150367	133445	107800	73546	28888	-	-
DEPRECIATION	499200	732160	698880	698880	698880	-	-	-	-	-
TAXABLE INCOME	-500600	-694980	-610744	-544299	-458531	324818	427101	550432	670293	775486
TAX (TAX SAVINGS)	-250300	-347490	-305372	-272150	-229266	162409	213551	275216	335147	387743
NET CASH INFLOW	248900	384670	393508	426730	469614	162409	213551	275216	335147	2387743
CASH FLOW BEFORE PRIN. PY	-583100	384670	393508	426730	469614	162409	213551	275216	335147	2387743
PRINCIPAL PAYMENT	9600	49280	101446	169222	256454	342533	446588	288876	-	-
NET CASH FLOW	-592700	335390	292062	257509	213161	-180124	-233038	-13660	335147	2387743
BALANCE ON LOAN	1654400	1605120	1503674	1334452	1077998	735465	288876	-	-	-
INTERNAL RATE OF RETURN	41.34	-	-	-	-	-	-	-	-	-
DISCOUNTED CASH FLOWS		-								

APPENDIX IV-1

AMERICAN SOLAR KING CORPORATION
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FOR IMMEDIATE RELEASE

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AMERICAN SOLAR KING CORPORATION SIGNS
FIRST AGREEMENT UNDER SOLAR UTILITY PROGRAM
24,000 SQUARE FOOT SYSTEM VALUED AT OVER $1.5 MILLION

WACO, Texas, July 7, 1982 -- American Solar King Corporation (NASDAQ:AMSK), today announced the Company has entered into a contract to install a 24,000 square foot industrial solar energy system for Delft Blue-Provimi, Inc., a major diversified agri-business corporation.

The system, which is valued in excess of $1.5 million, is the first under American Solar King's recently developed Solar Utility Program. American Solar King will design, deliver and install the system, comprised of approximately 1000 high-performance medium temperature flat plate collectors, to Delft Blue-Provimi's Seymour, Wisconsin plant. The plant will purchase all of the solar energy produced by the system for the life of the ten-year contract, at a guaranteed rate of 80% of the adjusted monthly cost of the existing oil-generated system. Annual solar energy production by the system is guaranteed by American Solar King within a 5% parameter.

There is no capital investment to Delft Blue-Provimi. The solar energy system will be purchased by a third party, which will realize energy tax credits, investment tax credits and depreciation as well as receiving all of the revenues generated from the use of the system. American Solar King said that a letter of intent has been received for the third party financing and details will be announced when the agreement has been finalized.

-more-

APPENDIX IV-2

In announcing the agreement, Brian T. Pardo, President, said, "The signing of this agreement is a very significant event for American Solar King and the entire solar energy industry."

"The efficiency of this system relative to the existing energy system used by Delft Blue-Provimi will enable this one plant to save over 88,200 gallons (2,100 barrels) of oil per year, every year. At a current cost of $1.10 per gallon this equates to a savings of over $97,000 worth of oil in the first year. In addition, as oil prices escalate, cost savings to Provimi, and revenues to the third party system owner, will increase proportionately," he continued.

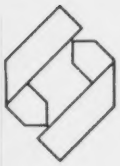
"Conservatively estimating the useful life of the system at twenty years, Delft Blue-Provimi could reduce its future oil requirements by over 40,000 barrels," Mr. Pardo said. "The implications of such a program, to the individual users as well as the entire country in terms of its ability to reduce its oil dependence, are very substantial."

In conclusion, Mr. Pardo said, "This agreement strongly evidences the viability of our Solar Utility Program, even during a period of relatively depressed oil prices. We are currently in various stages of discussions with several other major industrial corporations. We are highly optimistic that the continued success of this program will result in a substantial contribution to American Solar King's consolidated results in the years to come".

American Solar King is the nation's largest producer of solid temperature flat plate collectors and related solar equipment. The Company operates two plants with a combined manufacturing facility of over 90,000 square feet. American Solar King operates three regional distribution centers in Denver, Anaheim and Nashville in support of its 45 distributors and approximately 600 dealer/installers.

Delft Blue-Provimi, Inc., headquartered in Watertown, Wisconsin, is primarily engaged in the sale of high conversion milk replacer feeds for veal calves and produces and packages superior quality veal products. Revenues at Delft Blue-Provimi in 1981 exceeded $125 million.

# # # # #



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Biographical Sketch
John W. Wilson
Executive Director

As Executive Director, John Wilson directs the activities of the Renewable Energy Institute, a non-profit research organization focusing on solar, wind, hydropower, and other renewable energy technologies and the role they can play in helping this nation move toward a more sustainable energy strategy for the decade ahead.

Prior to joining the Institute, he served as the Legislative Coordinator for the Solar Lobby, directing the Washington lobbying activities for this national membership organization advocating increased emphasis on renewable energy and energy conservation. Wilson's advocacy activities were a logical extension of policy analysis he conducted at the Center for Renewable Resources and his previous experience as a key energy aide with two U.S. Congressmen.

His experience as the director of the Washington office of an Atlanta-based computer/telecommunications management consulting firm and his previous work with a multi-university policy research team provided him with a sound background in analysis and management.

Trained in Chemistry at Emory University, he has served on numerous private, governmental and academic panels concerned with energy issues.

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99-651 O—82——4

Mr. GOODWIN. Mr. Chairman, I would like to thank you for inviting me to appear and testify about the important issue of renewable energy development.

As John explained, I am director of the Tax Policy Project for the Renewable Energy Institute.

The previous witnesses have demonstrated in their testimony that the energy tax credit continues to play a key role in renewable energy development.

I would like to discuss an issue that has received considerable attention during recent debates over the energy tax credit. That issue is whether the credit is still necessary in light of the substantial incentives for business investment provided last year under the Economic Recovery Tax Act of 1981.

Before I start, I would like to call this committee's attention to a provision currently being debated in Congress that could have a significant impact on the energy tax credits that are available under current law, and on any energy tax credits that may be enacted in the future as a result of these hearings.

On July 2, the Senate Finance Committee approved a series of tax measures designed to raise the additional tax revenue required under the current budget resolution.

Although the administration's proposal to completely repeal the energy tax credit was not included in the Finance Committee bill, the bill does include a basis adjustment provision which could have an impact on the practical economic significance of the energy tax credit.

Under the basis adjustment provision, taxpayers would be required to reduce the tax basis of any capital asset acquired after the end of 1982 by half of the amount of any energy, investment or rehabilitation tax credits claimed with respect to the asset.

The practical economic consequences of this provision would be to reduce the value of the energy tax credit by approximately 20 percent. Thus, in effect, the 15 percent energy tax credit for solar, wind, geothermal and ocean thermal property would only be worth 12 percent, the 11 percent energy tax credit for hydroelectric generating equipment would only be worth 8.8 percent, and the 10 percent energy tax credit for other alternative energy investments would be reduced to 8 percent. Because I am not an economist, I cannot tell you precisely how much a 20-percent decrease in the net value of the energy tax credit will affect overall renewable energy development.

However, if it is adopted, this provision will obviously alter the economics of renewable energy projects, and could certainly cause some projects that are close to the margin of profitability to be abandoned. Hopefully, this provision will not be included in the final version of the bill.

However, even if it is not ultimately enacted, the mere proposal of a measure such as this perpetuates the state of uncertainty that has prevailed in the renewable energy industry since the Reagan administration took office. If this country ever expects to see meaningful renewable energy development in the private sector, energy developers must be allowed to function under a set of predictable and consistant rules.

I would like to turn now to the principal point which I intend to address this morning.

As the members of this committee are no doubt aware, one of the principal rationales for the administration's attempt to repeal the existing energy tax credit and for its opposition to new credits is that the credits are no longer necessary in light of the substantial investment incentives provided under the Economic Recovery Tax Act of 1981.

The energy tax credit and the other energy-related tax incentives are based on the underlying policy that it is in the national interest to accelerate the adoption of measures which reduce dependence on oil and natural gas as sources of energy. They are designed to promote this policy by encouraging businesses to accord higher priority than might otherwise be given to renewable energy and energy conservation investments. These incentives function by providing added tax benefits for renewable energy and energy conservation investments, over and above those that are available for other investments.

Congress expectation was that these extra incentives would direct a larger share of the total available amount of investment capital toward those investments which would help achieve our national energy policy.

The Economic Recovery Tax Act simply is not a substitute for these targeted energy incentives. The key business incentive provided by the Economic Recovery Tax Act is the accelerated cost recovery system [ACRS], which replaced the old asset depreciation range [ADR] system. Under ACRS, the depreciable lives of most business assets, including renewable energy equipment, are substantially shorter than they were under prior law. This increases the present value of the tax benefits associated with such investments. However, a key point about ACRS is that it leaves the relative position of energy- and non-energy-related investments substantially unchanged.

In other words, the ability of renewable energy investments to compete for the limited pool of available capital has not been changed at all by the Economic Recovery Tax Act. Accordingly, to the extent that we wish to direct capital investment to renewable energy projects, the energy tax credit remains essential.

Other provisions of the Economic Recovery Tax Act, such as the research and development credit, cannot substitute for the credit because they also do not affect the relative desirability of energy- versus non-energy-related investments.

As a matter of fact, there are some provisions of the Economic Recovery Tax Act which, although technical in nature, have placed renewable energy investments in a less favorable competitive position than the position they enjoyed prior to the enactment of that act.

I would like to point to two in particular. Under the Energy Tax Act of 1978, oil- and gas-fired industrial boilers generally were denied the benefits of accelerated depreciation.

The Economic Recovery Act effectively repealed that provision, thus making oil- and gas-fired boilers and renewable energy boilers eligible to the same extent for depreciation benefits. This took

away a competitive edge enjoyed by the industry and, if anything, makes the energy tax credit more important.

Another provision of the Recovery Tax Act which has had a similar effect on the competitive position of the renewable energy industry is the rehabilitation tax credit. Although that credit has increased the basic level of the tax benefits for rehabilitation, it did so at the expense of denying the energy tax credit for improvements made as part of a qualifying rehabilitation.

Accordingly, renewable energy investments, which under prior law enjoyed a competitive edge because they qualified for investment and energy tax credits when made in connection with a qualified rehabilitation, are placed on the same competitive footing with conventional investments.

These provisions, if anything, make the need to strengthen the energy tax credit and extend it beyond its current expiration date more important than it was prior to enactment.

Thank you for your attention.

[The prepared statement of Mr. Goodwin follows:]

PREPARED STATEMENT OF LEE M. GOODWIN

Thank you for inviting me to appear before you this morning to talk about the very important issue of renewable energy development. As John Wilson has demonstrated in his presentation, the energy tax credit continues to play a key role in the development of renewable energy projects. I would like to spend my time discussing a different issue which has received considerable attention during recent debates over the energy tax credit. That issue is whether the credit is still necessary in light of the substantial incentives for business investment provided last year under the Economic Recovery Tax Act of 1981.

Before I start, I would like to call this committee's attention to a provision currently being debated in Congress that could have a significant impact on the energy tax credits that are available under current law, and on any energy tax credits that may be enacted in the future as a result of these hearings. On July 2, the Senate Finance Committee approved a series of tax measures designed to raise the additional tax revenue required under the current budget resolution. Although the Administration's proposal to completely repeal the energy tax credit was not included in the Finance Committee bill, the bill does include a "basis adjustment" provision which could have an impact on the practical economic significance of the energy tax credit. Under the basis adjustment provision, taxpayers would be required to reduce the tax basis of any capital asset acquired after the end of 1982 by half of the amount of any energy, investment or rehabilitation tax credits claimed with respect to the asset. The practical economic consequences of this provision would be to reduce the value of the energy tax credit by approximately 20 percent. Thus, in effect, the 15 percent energy tax credit for solar, wind, geothermal and ocean thermal property tax credits would only be worth 12 percent, the 11 percent energy tax credit for hydroelectric generating equipment credit for other alternative energy investments would be reduced to 8 percent.

Because I am not an economist, I cannot tell you precisely how much a 20 percent decrease in the net value of the energy tax credit will affect overall renewable energy development. However, if it is adopted, this provision will obviously alter the economics of renewable energy projects, and could certainly cause some projects that are close to the margin of profitability to be abandoned. Hopefully, this provision will not be included in the final version of the Bill. However, even if it is not ultimately enacted, the mere proposal of a measure such as this perpetuates the state of uncertainty that has prevailed in the renewable energy industry since the Reagan Administration took office. If this country ever expects to see meaningful renewable energy development in the private sector, energy developers must be allowed to function under a set of predictable and consistant rules.

I would like to turn now to the principal point which I intend to address this morning. As the members of this committee are no doubt aware, one of the principal rationales for the administration's attempt to repeal the existing energy tax credits and for its opposition to new credits is that the credits are no longer neces-

sary in light of the substantial investment incentives provided under the Economic Recovery Tax Act of 1981.

The energy tax credit and the other energy related tax incentives are based on the underlying policy that it is in the national interest to accelerate the adoption of measures which reduce dependence on oil and natural gas as sources of energy. They are designed to promote this policy by encouraging businesses to accord higher priority than might otherwise be given to renewable energy and energy conservation investments. These incentives function by providing added tax benefits for renewable energy and energy conservation investments, over and above those that are available for other investments. Congress expectation was that these extra incentives would direct a larger share of the total available amount of investment capital toward those investments which would help achieve our national energy policy.

The Economic Recovery Tax Act simply is not a substitute for these targeted energy incentives. The key business incentive provided by the Economic Recovery Tax Act is the Accelerated Cost Recovery System (ACRS), which replaced the old Asset Depreciation Range (ADR) system. Under ACRS, the depreciable lives of most business assets, including renewable energy equipment, are substantially shorter than they were under prior law. However, while ACRS has increased the value of the tax benefits that are available for many items of renewable energy equipment, it has left the relative position of renewable energy investments and other business investments substantially unchanged. Indeed, for reasons which I will discuss shortly, some renewable energy systems are actually less attractive to conventional energy systems under ACRS than they were under prior law. Thus, unlike the energy tax credit, ACRS does nothing to enable renewable energy and energy conservation investments to compete more effectively for the limited amount of available investment dollars. Accordingly, ACRS does not make the energy tax credit unnecessary.[1]

Other provisions of the Economic Recovery Tax Act also fail to provide the kind of incentives for the renewable energy industry which render the energy tax credit unnecessary. For example, a 25 percent research credit was included in the Economic Recovery Tax Act in an attempt to encourage increased private sector research activities. However, like ACRS, the credit applies equally to all business research activities. Accordingly, the research credit does nothing to affect the priority accorded to research activities in the renewable energy industry. Instead, even with the benefit of the credit, businesses will continue to allocate their research resources, as they did under prior law, to the areas which promise the greatest economic return. In fact, since the repeal of the energy tax credit would diminish the market for renewable energy equipment, such a repeal could also lead to a decline in the amount of renewable energy research notwithstanding the availability of the research credit.

One provision of the the Economic Recovery Tax Act which could be of particular use to the renewable energy industry is the safe harbor leasing provision. No statistics have been compiled regarding the extent to which leasing has been used in connection with renewable energy projects. Nevertheless, because renewable energy projects which qualify for the energy tax credit generate a higher level of transferable tax beenfits than non-qualifying projects, they are particularly attractive as subjects for safe harbor leases. However, it is important to point out that, although safe harbor leasing could be of use to the renewable energy industry, it is no substitute for the energy tax credit. Safe harbor leasing is significant to the renewable energy industry precisely because of the existence of the energy tax credit. Acordingly, if the credit is repealed, leasing would also lose its significance.

Some provisions of the Economic Recovery Tax Act have actually placed renewable energy projects in a less favorable competitive position than they enjoyed under prior law. For example, under ACRS, renewable energy systems are actually worse off, compared to industrial oil and gas fired boilers, than they were under the ADR system. Under ADR, conventional and renewable industrial steam and electric production equipment generally had similar guideline lives. However, following the Energy Tax Act of 1978, renewable energy systems enjoyed a competitive edge over conventional systems because many oil and gas fired boilers were not eligible for accelerated depreciation, while comparable renewable energy systems were fully eligible. Under ACRS, conventional and renewable energy systems still have similar recovery periods. However, the Economic Recovery Tax Act effectively repealed the

[1] Of course, investments in renewable energy systems, like all other capital investments, could be increased if ACRS results in a general increase in the availability of investment capital. Nevertheless, the energy tax credit would still be necessary to provide the added incentive needed to give renewable energy projects the highest level of investment priority.

Energy Tax Act provision and extended the full benefits of accelerated depreciation to oil and gas fired boilers. This has eliminated the competitive edge once enjoyed by renewable energy systems.[2] As a result, conventional energy systems are actually more attractive relative to renewable energy investments now than they were before the Act.

Another example of a provision which has diminished the competitive edge of the renewable energy industry is the rehabilitation tax credit. The rehabilitation credit is a special credit for the cost of rehabilitating certain older buildings. The credit is 15 percent for the cost of rehabilitating 30-year-old buildings, 20 percent for 40-year-old buildings, and 25 percent for certified historic structures. However, because the rehabilitation credit is in lieu of both the regular and the energy tax credits, it not only fails to provide an incentive for the selection of renewable energy systems over conventional energy systems for use in rehabilitated buildings, it actually removes a competitive advantage enjoyed by renewable energy systems under prior law.

Prior to the Economic Recovery Tax Act, there was no special credit for building rehabilitation expenditures. However, rehabilitation expenditures qualified for the basic investment credit if they were incurred in connection with the rehabilitation of a building that was at least 20 years old. Since the credit under prior law was in addition to the energy tax credit, a renewable energy system (such as a solar space heating system) installed as part of a qualifying rehabilitation would have been eligible for both the energy tax credit and the regular investment credit. By contrast, a conventional energy system (such as an oil or gas fired space heating system) installed as part of a qualifying rehabilitation would only have been eligible for the basic investment credit. This gave renewable energy systems a competitve advantage for selection for use in connection with building rehabilitations.

While the Economic Recovery Tax Act has increased the basic level of the rehabilitation credit, it has removed the competitive advantage enjoyed by renewable energy systems by denying the energy tax credit for qualifying rehabilitation expenditures. This has also had the effect of reducing the total amount of the credit that is available for renewable energy systems installed in connection with building rehabilitations. Under prior law, expenditures for renewable energy systems, such as solar, wind, and geothermal systems, which qualified for both the investment and energy tax credits, would have received a total credit of up to 25 percent. By contrast, under the new rehabilitation tax credit, the level of the credit for most buildings is 15 to 20 percent, and the credit only reaches 25 percent if the building is a certified historic structure. Moreover, not only is the level of the credit lower for other buildings, it also serves to reduce the basis of the building, thus reducing the amount of depreciation which may be claimed with respect to the building. Accordingly, the new credit has not only eliminated the competitive edge once enjoyed by renewable energy systems, it has reduced the total tax benefits available with respect to renewable energy systems installed in connection with most building rehabilitations.

BIOGRAPHICAL SKETCH OF LEE M. GOODWIN

Lee M. Goodwin is an attorney in private practice in Washington, D.C. In recent years, Mr. Goodwin's practice has concentrated on the tax aspects of alternative energy development. In this capacity, he has advised clients on the tax consequences of alternative energy projects, and on the potential impact of proposed legislation on those projects. Mr. Goodwin is a frequent speaker on tax issues at conferences on alternative energy development, and has written numerous articles on the subject as well. He is a co-editor and contributing author of the book: "Alternative Energy: The Federal Role," published this spring by Shepard's/McGraw-Hill.

Mr. Goodwin serves as Director of the Renewable Energy Institute Tax Policy Project. In this capacity, he has recently completed a report on the impact of the Economic Recovery Tax Act of 1981 on the renewable energy industry. Mr. Goodwin also serves as Secretary, Member of the Board of Directors, and Chairman of the Legislative and Regulatory Affairs Committee of the International Cogeneration Society.

Mr. WOLPE [presiding]. Thank you.
Dr. Blum.

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[2] As under prior law, oil and gas fired boilers are still ineligible for the investment and energy tax credits. Thus, at least in the tax credit area, renewable energy systems continue to enjoy a competitive edge.

Dr. BLUM. Thank you very much, it is a pleasure to appear before you today.

I am executive director of alternative energy financing for Merrill Lynch. We are financing alternative energy projects and also are looking at the markets for alternative energy technologies in the future.

What I would like to do is share with you some of the conclusions we have drawn from our experience to date and from the analyses we have done of prospects for the future.

The key is to look at the nature of renewable energy technologies and what will determine whether or not they are used.

There are two attributes that are important. One is the quality of the technologies, how effectively and how reliably they convert these natural sources of energy into forms of energy that people want to use and find economically attractive; and second, how economically they are able to do that.

An important dimension of quality as perceived by potential users of these technologies is successful experience. Almost by definition, something which is new and an industry which is at the cutting edge of advanced technology, as renewable energy is today, does not have a long history of successful experience. Hence, it is viewed by many who would otherwise invest in it as being potentially risky.

As investors are wont to do in all areas, including the classical markets such as the bond market, for something viewed as having a risk, there is a premium demanded on the rate of return. In the bond market, for example, as of a week or so ago, Treasury bonds, 30-year bonds were selling at roughly 14 percent; AAA electric utility bonds were selling at 16 percent, or a premium of over 2 percent.

A somewhat lower grade bond, yet still investment grade, was selling at 17½ to 18 percent, a premium of almost four percentage points over Treasury bonds of the same maturity. So there is in the bond market a very substantial premium which investors demand to compensate them for perceived degrees of risk.

Clearly, there is a big difference between a bond for a well-established company with all sorts of guarantees behind it and investment in a relatively new technology; investors demand even yet higher premiums for the risk they perceive in the latter.

It is also worth noting that the overall market for energy, in spite of various moves to deregulation, is still not a free market. OPEC influences prices, although not so much as they used to, but it is not clear that that influence is completely gone. There are also a variety of special tax incentives in the law that are important for the financing of conventional oil, gas, coal, and uranium developments. We are involved in financing those, too, and many of those would not proceed without special incentives in the law for them.

As well, Mr. Chairman, expenditures for fuels that are used in business are operating costs deductible from revenues, so if a business is currently purchasing electricity from a utility, it expenses that cost of the electricity.

If it now substitutes a wind generator, photovoltaics or other form of renewable electricity, or a captive low-head hydroplant, that electricity it uses saves it only 54 percent of the cost of the

previous electricity because 46 percent of the cost was paid for by the Federal Government because it was expensed.

Thus, there are essentially already in the tax law a number of things that favor the traditional energy forms. The renewable energy tax credit or ETC helps to provide an offset or balance in the tax law that compensates for these.

Renewable energy is a different kind of investment, substituting capital up front with essentially no fuel cost for the ongoing expense of buying fuel. One has to recognize the different character of this investment.

There has to be an accommodation in the law that will do that. The tax credits are a very effective way of doing that.

As has been noted, the tax credit has been in effect only since 1978 and in its current form in essence 2 years, since mid-1980. Most of these projects take somewhat over 2 years to formulate, have designed, and to build. The R&D for these projects and establishing production lines takes several years more, so we are only now beginning to see the effects of the tax credits that were enacted in the past. A lot of decisions have been made and substantial investments have begun to be committed, founded on the assumption that there will exist this market that the credit has helped to create.

Of particular importance, for this committee has played such a major role in R&D for energy, is that the energy tax credit has helped create a market pull for the private funding of research and development in these areas.

Having the prospect of a substantial market has induced many firms to put substantial amounts of their own money into research and development, the substantial improvement of wind technology, solar-thermal technology, wood pyrolysis and gasification, solar collectors, and photovoltaics. They are all receiving substantial private investments—not specifically because of the R&D tax credits, which help reduce the cost of the R&D once firms decide to do it—but because those who invest in R&D see a market for the product which will be developed.

Most companies will tell you they don't make a product decision because of the tax law. But if the tax law helps to create a market pull, so that there will exist a market in which somebody wants these products, then the R&D is worthwhile. Once they decide to do the R&D, the R&D tax credit helps reduce its cost and they may be willing to put a few more dollars in than otherwise.

The R&D credit alone, if the market were not there, would be no reason to do the R&D. That is an important distinction that has sometimes been lost in some of the discussions.

I would like to give some specific examples of the value of the energy tax credit just to help add some numbers to the discussion. The major thing that the energy tax credit helps is to raise the equity for projects; the equity is the risk capital that is a share of the ownership of the project.

If a project does not succeed, the owners of the project may lose their investment. So equity basically is risk capital. It's substantially at risk.

In order to get this risk capital, you have to compete with a wide variety of alternative investments available in the marketplace.

These range from the very conventional, for example, a triple A tax-exempt bond. We sold a number of them recently for high rates, over 12 percent, which is equivalent for an investor at the 50-percent tax bracket of a 25-percent return pre-tax, a very high rate.

Such bonds are liquid, and reasonably secure. So we are competing in a market with liquid investments that are relatively secure that are paying very, very high rates of return. In that marketplace investors are demanding extremely high returns for renewable energy projects because of the relative insecurity of these new investments. They are risky; people don't know what the future of energy prices will be, or how well the technologies will work. Moreover, project investments are not liquid on the whole because of the 5-year vesting period for the tax credit. You can't sell them before the 5 years are up or you have some substantial tax consequences.

So taking into account all these premiums that people want to be compensated for in the marketplace, minimum after-tax return of somewhere between 20 and 25 percent is currently what the market is demanding for these investments. Investments that sell quickly offer closer to 30 percent after-tax, and very risky offerings—for example, R&D itself—must offer nearer 40 percent after-tax to sell today.

We helped raise the equity for a wind project of 100 50-kilowatt windmills installed in California in a windy pass. The cost of these windmills is about $2,000 per kilowatt less than the cost, for example, of a new nuclear or coal-fired plant. So these are attractive investments.

Even then the energy tax credit was required to get the rate of return up to a range of about 22 to 27 percent after tax—for buyers outside California—in the range I indicated earlier. This clearly proved attractive to investors; they bought it quickly. We were able to sell out the deal within a matter of a few weeks.

If the energy tax credit has not been present, the investment would have had a rate of return—for buyers outside California—in the range of about 14 to 20 percent.

That I do not think would have sold in today's market. Nonetheless, that rate of return on equity is higher than the average rate of return for even the most technologically advanced sectors of American industry today. The average rate of return for the chemical industry is 13.4 percent on equity. Many of the largest companies in that industry do not do nearly that well.

So that this is a socially productive investment which even without the ETC has a rate of return higher than the average for very good sectors of American industry. It is worthwhile for us to have. But because of the risk premium and all the other premiums required for the nature of this investment, the marketplace demands a substantially higher rate of return which the energy tax credit has helped to supply.

As we look ahead to future markets, as I noted, the R&D and substantial production investments which people are gearing up are driven by the prospect that the market will be there. Without the market there is no reason to invest today. Particularly in the absence or the substantial absence of the Government R&D programs in renewable energy that have been trimmed back substan-

tially, having the incentives for private R&D and production is paramount.

A study we have recently done on photovoltaic cells helps illustrate the point. As one looks ahead to 1985, for example, there are a number of firms that feel that they can deliver photovoltaic systems installed for a cost of about $2 per peak watt, substantially less than today's cost, but we feel it's within the realm of possibility for 1985.

Under various financing assumptions that are outlined in the written testimony, if one looks at the electricity price in 1985 that would be needed to yield the required rate of return, we find the following kinds of numbers: If one takes the ACRS schedule that is in the Economic Recovery Tax Act for 1985 with the energy tax credit, 5.5 cents a kilowatt hour—which is below the price of electricity at retail, for example, in suburban Washington today. Even so, it is enough to give these photovoltaic cells a very attractive rate of return and they would sell.

If the current ACRS schedule is retained with the tax credit, it's 6.5 cents per kilowatt hour, still attractive. Under the Finance Committee proposal to reduce the ACRS base by half the total tax credits, that price would go to 7.6 cents, just at the margin of what would be attractive in today's environment.

If we did not have the energy tax credit, these prices would be from 4 to 4.5 cents per kilowatt per hour higher. For example, at the current ACRS rates, instead of 6.5, this would need a price of 10.9 cents. This price is higher than the price everywhere except maybe in the New York City metropolitan area, which has somewhat higher retail prices for electricity but not a great deal of sunshine.

With the energy tax credit and with today's ACRS, at reasonable prices for photovoltaic cells, such cells would deliver electricity at prices competitive with today's prices in most of the country. Without the energy tax credit, they could not do that.

This is a very substantial and important point. Why is it so important? Because most people see photovoltaics as a substantial worldwide market. The Japanese are already active in this market.

The energy tax credit will help the U.S. firms to gain a U.S. production base to compete effectively with the Japanese internationally. The potential cost of not doing so is to lose what many feel will be a market that parallels that of the entire electronics industry today.

Why is the energy tax credit so important for financing?

There are two main reasons. One is that it occurs early. If a project takes more than 2 years you can take progress payments on the energy tax credit. If it does not take more than 2 years, the credit is effective in the year in which the project goes in service. It has a very high up-front net present value.

Spreading depreciation out over the 5 years, at today's interest rates and implicit cost of money, means that the value of the spread depreciation deduction is substantially less in present value terms than its face value. It is discounted substantially because much of the benefit does not occur for several years.

Another reason is that, like a deduction such as depreciation, the tax credit does not depend for its value on the marginal tax rate

the investor pays. A deduction such as depreciation is worth only what it saves somebody at his marginal tax rate. The energy tax credit is dollar for dollar an offset against taxes. Therefore, the tax credit is worth as much to a small business that pays a lower tax as it is to a corporation paying the full rate of tax. It has as much value to investors who now pay a low marginal rate and yet may have substantial funds to invest as it is a person who has high taxable income in the 50 percent bracket under the new tax law.

Moreover, with the discussion currently in Congress of a possible flat rate tax, with a low marginal rate, the value of a deduction such as depreciation to an investor at the low marginal rate would be seriously reduced. At that point, financing that depended on such deductions would have to be totally restructured or not be raised from individual investors at all because the value of these deductions would be a third, perhaps, of what they are today.

Whereas, the energy tax credit would still retain its entire value and would therefore be even more essential, if the flat rate structure were to come to pass, in financing these projects.

I hope that these examples help to provide some background for discussion on the energy tax credit. It is our feeling that it offers a very worthwhile investment for the Nation with very substantial returns for renewable energy. Thank you.

[The prepared statement of Dr. Blum follows:]

TESTIMONY OF DR. EDWARD H. BLUM, VICE PRESIDENT AND EXECUTIVE DIRECTOR, ALTERNATIVE ENERGY FINANCING, MERRILL LYNCH WHITE WELD CAPITAL MARKETS GROUP

Mr. Chairman and members of the committee; it is a pleasure to appear before you this morning to testify about the business energy tax incentives for renewable energy technologies.

My name is Edward H. Blum. I am a Vice President of Merrill Lynch, Pierce, Fenner & Smith and Executive Director of Alternative Energy Financing in the Merrill Lynch White Weld Capital Markets Group, the investment banking arm of Merrill Lynch. My colleagues and I are actively finanacing the development and use a wide range of renewable energy technologies.

In our experience to date, the business energy tax credits have proven effective and essential. I would like to share this experience with you, provide some illustrative numbers and details, and then address the specific questions raised in your letter of invitation.

RENEWABLE ENERGY MARKETPLACE

I would like to begin by noting a few key points about the marketplace for renewable energy. These outline the context within which financing must take place.

First, it is worth emphasizing that conventional forms of renewable energy are already important in the United States' economy, and that less conventional forms hold the potential of supplying very large quantities of energy in the U.S. and abroad by the end of this century. Official statistics do not adequately cover renewable energy. But generally accepted estimates are that wood and hydroelectricity together now contribute the equivalent of roughly 2.5 million barrels of oil per day, over six percent of total U.S. energy use, with much smaller but rapidly growing contributions from wind and direct uses of solar energy. Estimates of future use vary widely. The potential, however, is clearly large. Many studies show the possibility that renewable sources might provide over 20 percent of the total U.S. energy supply, and even larger percentages of the supply for countries less well endowed with oil, gas, coal, oil shale, and uranium.

How extensively renewable energy technologies are and will be used is largely determined by the quality of the technologies (that is, their ability to convert natural energy into useful forms reliably and effectively) and by competitive economics. An important dimension of quality is successful experience. Because many renewable energy technologies are new and rapidly improving, with little documented experi-

ence to date, investors still see them as risky. To move them into the marketplace, especially in the absence of an independent testing or verification program, thus requires offering investors a "risk-premium"—a rate of return higher than that available on more conventional investments.

This relation between risk and reward is very clear in the bond markets, where the rating agencies evaluate and attempt to quantify risk into specific categories. For example, on July 7, 1982, the prices of 30-year electric utility bonds rated Aaa (the best rating) had to be priced to offer interest rates of 16.07 to 16.27 percent; new 30-year electric utility bonds rated Baa (the lowest investment-grade rating) had to offer 17.47 to 18.22 percent to attract buyers. Investments involving new technologies are not generally rated so formally. But investors' perceptions and demands for higher returns to offset perceived risks are quite similar.

Second, it is worth nothing that, despite moves toward deregulation, the overall market for energy is not a free marketplace. Internationally, oil prices are influenced by OPEC production decisions. This influence is not as great recently as it has been in the past. But the recent wide swings in oil prices and the considerable uncertainty about future prices add to the sense of risk and complicate and hinder decisions about alternative energy supplies. Domestically, producers of traditional fuels (e.g., oil, coal, and uranium) have obtained tax treatment for the costs of extraction and for depletion that continues to be important in stimulating production and in obtaining the needed capital. Federal and State regulation continue to control the prices of natural gas and electricity.

Moreover, expenditures for fuels used in business constitute operating costs, deductible from revenues in computing income taxes. Renewable energy sources are generally not purchased from someone else; capturing the river, the wind or direct solar energy substitutes capital investment for the continuing expense of fuel. Tax incentives for renewable energy capital investments provide equitable balance, partly offsetting the tax advantage of fuel expensing.

FINANCING EXPERIENCE

The business energy tax credit (ETC) was originally enacted in late 1978, and the current renewable ETC dates from mid-1980. Substantial projects take over two years to conceive, design and build. And technologies not previously in widespread use often require several years to evolve through research and development (R&D) into the marketplace. Therefore, the impact of the business renewable energy tax credit is becoming visible only now.

From my perspective, the impact of the business renewable energy tax credit is already significant, and is becoming increasingly so. It has proved effective and essential in the financing of economically attractive projects in biomass (e.g., wood- and waste-fired cogeneration), geothermal energy, and wind energy. And it is a key element of financings being developed for these areas, for low-head hydroelectricity, and for solar process heat and solar-powered electricity generation. For these financings, the ETC plays a major role: it helps transform projects that are merely economic and competitive with oil into ones that have returns high enough to attract the necessary risk capital.

By helping renewable energy investments to attract risk capital, the ETC has also helped create a "market pull" for private funding of research for the ultimate products stimulates well-established firms, young entrepreneurial companies, and venture capital sources to invest in improved products that will be more competitive and might capture significant market share. Evidence of this is the rapid progress being made in intermediate-size wind turbines (50 to 500 kilowatts rated capacity), in wood pyrolysis and gasification, in trough and dish high-temperature solar collectors, and in photovoltaics.

Some of the developments have benefited from Federal R&D support. But much of the most recent progress with which I am familiar stems from private investment attracted by the prospect of a large market. If that market remains strong and continues to grow, investors who have supported successful developments can earn the rewards that will repay them for the substantial risks they have taken and continue to take.

I would like to illustrate the value and importance of the ETC using figures from specific renewable energy projects we have financed or analyzed for financing. To clarify the terms and concepts, I would like first to describe briefly how renewable energy projects are typically financed and what returns are needed in today's financial markets.

Broadly speaking, projects are financed with two general types of funds:

Debt: which is money loaned to the project's owners at determined (though not necessarily fixed) rates of interest, with a determined schedule for repayment of interest and principal. To assure repayment, the loan is typically secured by creditworthy guarantees and/or collateral.

Equity: which is risk capital invested for a share of the project ownership. Repayment is not guaranteed; the investor can lose most of his money if the project fails. Return on investment is achieved through the tax benefits accruing to the project's owners plus the operating profits left after paying expenses and the principal and interest owed on the debt.

Although today's credit markets are tight and interest rates are high, some debt can generally be obtained for a sufficiently attractive and creditworthy project. Projects viewed as particularly risky—perhaps because their technology is new and untried, because they are large, or because their economic returns depend too greatly on governmental actions—may not be able to obtain debt without loan guarantees.

To obtain equity or risk capital for an energy project today entails competing for investors' funds with a wide range of alternative equity investments.

Within a corporation, a project must mesh with overall corporate strategy and compete with other investments open to the firm. For non-corporate investors, institutions or individuals, the project must offer rewards at least as attractive as those available from more conventional investments, and commensurate with the perceived risks.

Today, very high returns can be obtained on relatively conservative and liquid investments; for example, Aaa rated tax-exempt bonds are yielding over 12 percent. Most project equity investments are comparatively illiquid; sale of ownership interest before the end of the five-year vesting period for investment and energy tax credits can have adverse tax consequences, and limited partnership interests in general cannot be freely traded. Add to these considerations investors' concerns about the course of future energy prices, and the risk premium noted earlier. As a result, we find that to attract equity investors today, a sound renewable energy project must offer a minimum probable rate of return on equity between 20 and 25 percent after-tax, and have the possibility that the return could go even higher. (This rate of return is an average annual return over a project's life.) In this market environment, the business energy tax credit is a vital element in attracting equity capital for renewable energy projects.

Recently, for example, we raised the equity for a wind project comprising 100 50-kilowatt windmills to be constructed in a windy pass just east of Livermore, California. The business and technology aspects of the project proved attractive, and the windmill price—$2,000 per kilowatt of capacity installed—was competitive with alternatives. Based on reasonable estimates of future electricity "avoided costs" in that area, our projections showed a likely return on equity in the range of 22 to 27 percent after-tax, including the benefits of the ETC. The project equity sold well; the transaction was completed in less than one month. Without the ETC, the return on equity with the same projections would have been only 14 to 20 percent after-tax. With this lower rate of return, I doubt that investors would have purchased the equity interests, and the project would not be built.

One might argue that, if the return were not high enough without the ETC, then perforce the project must not be competitively economic and should not be built—that it would divert resources from potentially more profitable ventures. This argument, however, ignores the realities of the marketplace, noted earlier, that today require a premium rate of return for these new technologies. Even with the 14 to 20 percent rate of return on equity, the project would have a better rate of return than much of American industry, and thus would be a worthwhile investment for the nation. According to "Chemical and Engineering News," for example, the average after-tax return on equity even in the comparatively profitable and technologically advanced U.S. chemical industry was only 13.4 percent in 1981, and only 6 of the 40 larger firms in the industry exceeded a 20 percent rate of return on equity. Moreover, for the Treasury the project is expected to yield over its life more in tax revenues than the total cost to the Treasury of tax credits and depreciation allowances combined.

FUTURE MARKETS

Substantial investments are now being made in R&D for renewable energy technologies—such as solar thermal, photovoltaics, and larger wind turbines—that should come to market over the next three to five years. And some companies are considering building expensive production lines that could significantly reduce costs—for example, of intermediate-size wind turbines. Increasingly, the private

sector is investing in these key steps for renewable energy technologies. But it is doing so with the expectation that a worthwhile market will be there.

The ETC is important to assuring that market, and thus to ensuring that these firms will find it attractive to make and to continue these R&D investments. Especially with the major reductions in Department of Energy R&D funding, such continued private investment is critical. Extending to 1990 the current 1985 expiration date for the ETC would provide the kind of investment certainty that the Administration has eloquently argued is so critical in other areas.

To add a quantitative dimension, I would like to offer an illustrative example from studies we have done for photovoltaics. As you know, photovoltaics are widely felt to be one of the most promising renewable energy technologies, with a potential world-wide market approaching several hundred billion dollars. Several of our clients, and others active in photovoltaics, estimate that they can achieve by 1985 or 1986 photovoltaic systems installed costs of roughly $2.00 per peak-watt of capacity. Such a system cost might include panels costing $0.50 per peak-watt, achieved through large-scale production, and "balance of systems" costing roughly $1.50 per peak-watt, achieved by simplification and serious cost reduction. Such a system, financed relatively conservatively, could achieve the risk rates of return required today with the aid of the ETC.

Consider a system with such a cost, installed in a very sunny area that yields 2500 kilowatt hours annually per peak-kilowatt of capacity, financed by institutional or corporate investors with 60 percent equity and 40 percent debt (with a term of 15 years at 15 percent fixed-rate interest). Although some forecasts are higher, assume that the price paid for the system's electricity increases five percent per year. We tabulate the electricity price needed in the first year to yield the investors a 25 percent rate of return on equity after-tax.

The following table shows the value of the ETC for three ACRS depreciation schedules: (1) That enacted last year to take effect for calendar year 1985; (2) the schedule in effect now; and (3) the Senate Finance Committee proposal, which would reduce the ACRS base by one-half the amount of the investment and energy tax credits and retain the current schedule.

	Electricity price (cents per kWh)	
	With ETC	Without ETC
ACRS schedule:		
ERTA for 1985	5.5	10.0
Current	6.5	10.9
Senate Finance Committee proposal	7.6	11.4

As this table shows, extending the ETC would help ensure that electricity from photovoltaic systems would be competitive with electricity from other sources in most parts of the United States by the mid-1980's. It would thereby help to hold down increases in electricity prices across sunny parts of the nation and reduce costs to consumers for whom photovoltaics would become the preferred supply. The impact of the ETC is quite significant; it is worth, in this example, roughly 4 cents per kilowatt hour. By helping to build a substantial U.S. market for photovoltaics in the mid-1980's, it would assist U.S. companies to establish a solid production base from which to compete effectively with heavily subsidized Japanese photovoltaic activities in the world market.

FINANCING VALUE

The ETC is so important in equity financing for two main reasons. First, it can be taken by investors in the year the renewable energy equipment is placed in service. For equipment taking over two years to build, it can be taken on a progress basis. It thus is not diminished by the very high discount rates investors apply today, and retains a substantial net present value. Depreciation allowances, spread over five years or more, are not valued by investors at anywhere near their face value.

Second, a tax credit, unlike a deduction such as the depreciation allowance, does not depend for its value on the marginal tax rate the investor pays. The ETC is worth as much to a small business paying a lower tax rate as it is to a corporation paying the full 46 percent rate at the margin. It is also worth as much to an individual investor not in the top tax bracket, who may have funds to invest, as it is to someone paying the top rate of 50 percent. Moreover, since the ETC's value does not

depend on what the marginal tax rate may be, investments in which the ETC is important will be affected less than those relying on depreciation and other deductions during the period of uncertainty created by the discussion of the possible low "flat rate" income tax structure.

CONCLUSION

At its current level, the business energy tax credit is quite important for the financing of renewable energy projects, as I hope the examples presented have helped to show. To continue the stimulus for private sector investment in renewable energy R&D, and to continue the increasing pace of renewable energy development and use, maintaining and extending the ETC is a national investment offering very substantial returns.

Thank you very much. I will be pleased to answer any questions the Committee may have.

Mr. WOLPE. Thank you, Dr. Blum.

Mr. Huyck?

Mr. HUYCK. One of the advantages of coming at the end of a panel of this quality is that you can mentally edit your comments as we pass from one person to the next. Let me be very brief since most of what I have to say is in the written testimony, and it's straightforward there.

Let me recapitulate two points that Ed Blum made and some other panel members mentioned. When you are engaged in financing any kind of technology, particularly renewable technology, you are involved in a risk-reward assessment. One of the problems for those of us financing these projects is that the equation doesn't remain stable enough for us to generate numbers on which we can encourage people to invest.

Other key variables in the equation—in addition to tax credits—such as and deregulation and the avoided cost price that is available, have all been subject to judicial appeal and have been attacked by the utilities. There is very little predictability with which we can work, and that, as anyone in the financial sector will tell you, that leads to either an appetite for a higher return to compensate for the perceived risk or even a general aversion to that investment.

Let me also review the context in which we are trying to finance these projects. Over the last few years there has been significant deterioration in the capital markets. We have seen the effective disappearance of the one capital market that distinguished the United States from the rest of the world, that is the long-term fixed rate institutional capital that was available that allowed U.S. industry to take a long view of its investment opportunties.

If you talked to any insurance company today and asked them what funds they have available, the odds are you will get the answer: Short term, floating rate.

Trying to compete in a capital-constrained floating rate environment is an extra burden on this type of project, particularly, as was mentioned earlier, because the very character of a renewable resource project is that it's an up-front capital expenditure justified by savings of fuel.

If you have to finance a project of that character, your capital burden up front is substantially higher. That means you are carrying extra weight compared with a project that is not aimed at substituting capital for fuel. That, in turn means the compensation

factor inherent in a tax credit of the type we are talking about is particularly poignant.

Last, let me place the situation of renewable resources in context with a metaphor that is fashionable in the world of biology. One thing that bothered me over the years is what I would call the doctrine of mutual exclusivity. Everyone has their favorite technology whether it's nuclear, coal, synthetic or renewable. Most of them are propounded at the expense of the others. The theory of natural selection, which has received a lot of publicity lately, is that if we have a diversity of opportunities the characteristics most appropriate to the new environment, with the greatest flexibility to adjust, will be selected out by the system to be successful.

Unless we have a diversity of options as the underlying premise, there can be no effective selection. Locking yourself into any one technology seems to me a very high risk approach to dealing with the energy problem.

Thank you. I hope now this will turn into a dialog.

[The prepared statement of Mr. Huyck follows:]

STATEMENT OF PHILIP M. HUYCK ON THE ROLE OF BUSINESS INCENTIVES IN THE DEVELOPMENT OF RENEWABLE ENERGY TECHNOLOGIES

SUMMARY

The value of energy tax credits must be understood in the context of the risks and rewards associated with commercial scale production of a renewable resource technology. The tax credits do not operate in isolation, but in an extremely complex and volatile investment climate in which oil prices, deregulation of preferred technologies and avoided cost pricing options under the Public Utility Regulatory Policies Act of 1978, and the overall current economic situation are also crucial factors.

There is no question that the energy tax credits can have a major impact on the investment decision. The tax credit system is quite simple and even handed compared with alternatives such as government guarantees or price supports and has the potential to be a more effective and reliable incentive. And there are a number of specific cases in which the loss of energy tax credits would clearly be fatal to potential wind, solar, and geothermal projects. The impact so far has been limited due in large measure to the long lead time inherent in overcoming some key technological impediments. The 1985 expiration date is likely to have a chilling effect on commitments beginning today because of the real possibility that the projects could not be developed in time to take advantage of the credits.

Like the medieval scholastics, one can debate eternally how much in the way of incentives is necessary. The key point to recognize is that the debate over the continuation of the energy tax credits now in existence (including the extensive delay in issuing implementing regulations) and their scheduled expiration have effectively vitiated their contribution to the development of renewable energy resources. In many cases, their ambiguous and uncertain character may well have made the situation worse than if they had never existed in the first place. Some measure of reliability and predictability must be restored to this key element in the investment decision relating to renewable resources. Much as this investment decision involves a risk/reward assessment, Congress must decide in the context of our energy strategy and goals whether the cost to the taxpayer is worth whatever reward may lie in having a viable renewable energy industry as a hedge against future interruptions in energy supply. To truncate the program now in response to a temporary glut of available oil may be a decision one could live to regret if the world turns out to be less stable than predicted.

TESTIMONY

My purpose is to try to put the energy tax credits in perspective in the context of the incentives sufficient to mobilize investment in renewable resources. Any investment decision is a risk/reward analysis. Investment in new technologies or resources are really no different. The risk elements are generally greater because of the unknown nature of the technology or resources and therefore the balancing

reward must be commensurately greater. The more volatile or unpredictable the environment, the greater the projected reward must be. At some point, there is no reward sufficient to compensate for the preceived risks.

A review of the elements of risk and reward for renewable resources and a synopsis of what has happened to them in recent years is a useful, indeed indispensable, exercise. The following list is not intended to be exhaustive. It merely illustrates the character and course of some of the major elements in the renewable resource sector.

Risks

Technological.—In areas such as wind turbine generation and solar, the technological risk is very real. One should point out the risk of recapture of an energy tax credit if the related assets are no longer used for the original purpose. While much progress has been made, there is still a very real risk that the technology simply will not function on a long-term commercial scale.

Resource.—In many cases, even a proven technology faces a resource risk. For example, stream flow variations in hydro projects can be substantial. The same resource risk is relevant with respect to the wind regime or insolation factors, about which much less may be known than stream flow for hudroelectric facilities.

Environmental.—The environmental risks are always significant. While one might think that renewable resource projects would be welcome as particularly benign compared with the alternatives, there are vocal opponents to hydro, geothermal, wind, etc. The greatest fear here is a new requirement imposed late in the construction process. For example, the recent decision by the Federal District Court for the District of Columbia that dams are "point sources" of pollution for environmental purposes has cast a cloud over many small hydro projects.

Regulation.—One of the major concerns of potential participants in this area is that the exemption from regulation may not be a reliably permanent factor in the equation. Many of the discussions with institutional lenders who are also considering an equity interest center around how to divest their equity interest should they ever by exposed to regulation as a utility in the future.

Market.—Any new source of electric generation has to be concerned about its ability to sell its output. The avoided cost sale authority inherent in Title II of PURPA has been under continual attack by many members of the electric utility industry. Nearly four years have expired since PURPA's original passage, and we are still at a stage where legislation is pending (H.R. 6500 in the House of Representatives) to clear up certain critical unresolved issues.

Price.—The recent drop in published avoided cost rates in California and other states has had a major impact on the project economics of renewable resource projects. Regardless of whether this drop reflects particularly favorable hydro conditions and natural gas availability or merely a drop in oil prices, the wide swing in prices is a major disincentive and lenders making investment decisions.

Capital availability.—In todays's economic climate, capital is at a premium. The present level of interest rates and the substantial deterioration of the classic long-term, fixed rate capital market have a dis-proportionate impact on renewable resource projects. The essence of renewable resources in the substitution of capital for fuel cost. This entails assessments not only of the price of the fuel displaced but also of the cost and availability of capital. The latter area has also become extremely unpredictable as a result of the Federal Reserve Board's policy shift in October 1979. The extremely high real cost of capital and the fluctuation of floating rates make capital intensive projects particularly vulnerable.

Rewards

Economic.—Ultimately any investment must meet a hurdle rate off return on some reasonably reliable basis. Tax incentives are a factor, a key factor, in that process, but do not operate in isolation.

Intangible.—Some investment decisions are being made in areas of new technology on the basis that establishing a position in a new technology may have positive implications for market share if the area develops. This long-term view can justify taking some risks at an early stage, but as the perceived need for renewable resources wanes and capital availability becomes a serious problem, the ability of subgroups in a corporate environment to sustain continuing cash outflows for renewable resources is seriously eroded.

CONCLUSION

In my experience, the energy tax credits have not provided the incentive they should have. First, the Internal Revenue Service implementing regulations often

took years to issue. Second, even the existing tax credits appeared under continual attack in Congress. Third, the expiration dates were in most cases too early to be factored into the investment decision in any meaningful way. In effect, the investment analysis often discounted the availability of these benefits, and they failed in their purpose. In an environment with too many unknown variables, as I have discussed above, energy tax credits have not been a constant. Extending the credits by some reasonable period is the only way they will have any real impact on encouraging the development of renewable resources.

Tax credits can be the deciding factor in the decision to proceed today with a renewable resource project. But they can only play this role effectively if they are available on a coherent, reliable basis and can be integrated into the investment decision process.

Mr. WOLPE. Thank you very much, thank you all for excellent testimony. All of you have addressed in one fashion or another the various arguments raised by the administration in pursuit of its efforts to phase out various tax incentives or credits for renewables. I would like to focus in on those arguments in series, if I may.

There are three basic arguments, and I would like you to respond to each of them specifically. The first is that with the decontrol of energy prices there simply is no longer the need for an artificial economic incentive for renewable energy systems. The rising price of petroleum has now created the ability for alternative technologies to be economically viable.

Could you respond to that?

Mr. HUYCK. The debate about what is necessary and how much is necessary reminds me of the old children's poem about the blind men and the elephant; they are hanging on to a different part of the elephant and they are all describing perfectly accurately what they are hanging onto but no one is describing the elephant.

In the context of its effects of oil prices, the answer is yes, but for one thing it has not been a secular rise in oil prices, and it has been exactly the thing that many people feared, which is a sudden rise and a sudden fall. I can remember Walter Levy being quoted when world prices began to fall saying that it may be as dangerous as a sudden increase because it deprives everyone looking to develop any technology, I don't care whether it's renewable resources or whatever, deprives them of predictability necessary to make the investment.

I can tell that the fall of the avoided cost in California, for example, dropping from 7 cents to a nickel has created a great deal of confusion in negotiations over potential projects. The impact on people halfway through a renewable resource project of that kind of drop and unpredictability has inflicted as much damage as any other development.

So the premise may be accurate—if you make certain assumptions—that a rising price of oil will encourage other technologies. But falling oil prices due to a temporary glut can have also a strong negative effect.

So the answer is it helps as deregulation helps, but in many cases oil price decontrol is not sufficient in its own to provide the incentive in this incipient stage.

Mr. WOLPE. Dr. Blum.

Dr. BLUM. Just a few other points. I thought those were very good points. As much as we have discussed the difficulties of the market in renewable technologies, it is worth noting that my colleagues raising money for oil and gas activities these days are in

far worse shape. The oil and gas financing market has collapsed this year. Last year it was a boom; this year it's dead.

One of the reasons is precisely the uncertainty just mentioned about what is happening. Even though that market has been deregulated, right now there are idle drilling rigs all over the country. There are companies that have borrowed heavily in the hope of having oil production increase that are now going bankrupt. The cash flow is way down and that industry in many respects is in poor shape.

So I think we are seeing that while we may have had a partial deregulation in a part of the market—it's important to emphasize that the gas market has a variety of controls, the electricity market is heavily regulated at the local level and partly at the national level—we have a long history of special tax incentives in the law for other energy sources without which those energy sources would not be able to get financing.

I am involved in financing many of those as well. If pressed, I could enumerate the tax advantages available for coal and oil that we are relying heavily on for financing of those activities.

So renewable energy technologies do not exist in a free market. It's not a free market at all. Even the sectors that many feel approximate a free market are having trouble raising investment. They are going through wide swings from the euphoria of a few years ago to a terrible depression in many aspects, of that industry now.

And, therefore, if that is the prescription recommended for this aspect of the industry, I would say that most of those who are active in oil would not find it a good prescription at all.

Mr. WOLPE. Would anyone else care to add to that?

Mr. DANZIGER. Yes. First of all, when presenting a project there is no greater sensitivity than where are the prices of the alternate fuel going to go because that is essentially where the revenue stream comes from, at least in terms of electrical generation technologies where one gets revenue from avoided costs.

In our presentation of projects to some of the members of this panel, or companies represented by this panel as well as others, we have been asked what happens if energy prices don't go up. Then, beginning the first quarter of this year, we started getting asked what happens if energy prices go down?

The bottom line really is that those of us who have some concern about the long term economic well-being of the United States believe that we would like to present escalation rate scenarios most favorable to this country. We don't want to assume radical increases in the prices of oil and gas for the next 20 or 30 years because that would create severe hardship.

I just hope that we don't have such massive increases in the prices of oil and gas that renewables will be a shoe-in as I think the administration has perhaps assumed based on the experience of decontrol.

In addition, in the long view, it is important to note that renewables are, at least 4 to 6 months out of the year, going to be competing with coal and other baseload resources other than oil and gas.

The prices are going to have to come down significantly from this point. So I would just say that while deregulation and operation in

a deregulated environment is essential to the long term, renewable energy industry needs that. For the next 6 or 7 years it is important that the credit be available to take the risk premium particularly associated with where the price of oil and gas go over the next 7 or 8 years.

Mr. WOLPE. The other two arguments raised by the administration in justification of its policy relate to the allegation there is a free market out there, and the administration is committed to maximizing that aspect. I think that was addressed in previous remarks.

The third argument is there is no way to essentially avoid windfalls that flow to investors or to firms that would have introduced some technologies even without the tax credit, and that it's an inefficient means of providing the necessary incentive. Would any of you respond to that third argument?

Mr. HUYCK. Very briefly, Mr. Chairman, any time you have a price in a market, the most efficient producer gets a "windfall." What we are trying to do is move the clearing level at which the market can function to encourage people on the edge, who are looking at a go or no-go situation, to encourage them to take that next step, to commit to the infrastructure building that is necessary to get the Nation's energy renewable resource industry off the ground.

I have not been impressed by the argument that somebody will get a windfall. Our system is premised that the most efficient producer will get the windfall. We have to get the person at the margin to move ahead for what we think are good and justifiable policy reasons.

Dr. BLUM. It's worth noting that every part of the Tax Code potentially offers a quote, windfall, unquote to highly efficient producers, as was just mentioned. If you have someone with a far superior semiconductor chip or computer design, he can still borrow money at essentially the same rate as any other company with the same rating; he gets the same investment tax credit, depreciation is the same. All the rest of the Tax Code is not premised on whether he is more efficient or has a larger market share or better product than somebody else.

That is his due reward for having a better competitive position. In fact, that is the incentive this marketplace provides for someone to be superior and that is one of the engines of the American economy. It causes the whole thing to run. If you can get a jump on someone else, you will make more money than he will until he catches up with you.

If you didn't have that reward then the economy wouldn't function. This is simply another part of that code that offers potential gains to people who get a jump on someone else. I would hesitate to call it a windfall; it's inappropriate to call it that. It's an opportunity for gain on the part of those who are productive. It does not, as I noted earlier, subsidize poor projects. The project that might be viewed as unattractive by investors today because its rate of return would not have a sufficient risk premium, or premium for illiquidity, nonetheless has a rate of return above that of advanced American industry.

It's still a productive investment for the economy, but the incentive is necessary in order to attract investments into it today.

Mr. WOLPE. Thank you.

Mr. Danziger.

Mr. DANZIGER. Yes, first of all I would like to start off by saying I don't consider a 20- to 27-percent aftertax return to be particularly a windfall. It's been my experience that that is the range of returns that we are talking about on many of these first of a kind commercial projects in the wind and some other areas where we are talking about commercialization of technology developed over the last few years.

In addition, I would like to state that when analyzing a project one must analyze it as I said before, in what amounts to a conservative or perhaps a worst case scenario. I am just not seeing windfall returns being made by developers.

Moreover, on these technology development projects or first of a kind projects for photovoltaics and others, for example, where the cost is $5,000, $6,000, or $10,000 a kilowatt installed, all you are really allowing is that the manufacturer or promoter to lose less on the first project.

Indeed, if the real question is, has there been or is there potential for abuse of the tax credit, the answer is clearly that there is potential for abuse but it's been my experience over the last 3 or 4 years that there has in fact been no significant abuse of the tax credit on large projects.

This is principally because of the at-risk rules, because when one gets to the big projects and institutional investors there are so many tax opinions, that abuse is virtually impossible because you have to satisfy the most conservative member of the investment community.

So I just don't see windfalls as a practical matter. It is possible if you take the position that all of a sudden oil and gas prices go out of sight and the utilities remain dependent on oil and gas, there could be some significant windfall but that would only be if we have what amounts to an energy tragedy in the United States.

Mr. WOLPE. Thank you very much.

At this point, as I turn to recognize the gentleman from New York. I just want to take this opportunity to commend Mr. Fish and our chairman, Mr. Fuqua, on their introduction of the bill to extend the business energy tax credits from 1985 to 1990. I am delighted to lend my own name as a cosponsor.

Mr. FISH. Thank you very much, Mr. Chairman.

I want to congratulate you on having such an excellent panel with such compelling testimony which we have heard today.

Like you, I would like to ask a couple of questions, and really raise some of the doubts and concerns that others have expressed so that you can make a complete record here and give us the benefit of your responses.

Of course, we have to be concerned with any tax initiatives about possible revenue losses. Some of the first panelists talking did address this issue with respect to the fact that Treasury losses had not been as great as had been anticipated.

I don't think you, Mr. Blum or Mr. Huyck, got into the question of the effect on revenues. I would like to ask you if you have any

thoughts on the estimates as to likely revenue losses if we do extend the business tax credit to 1990?

Dr. BLUM. I wish I were sufficiently prescient to be able to see precisely what investment will take place in this area. Then I would be able to tell you what the revenue loss would be based on a simple percentage of the investment that would be put in.

Unfortunately, having spent a number of years attempting to do such forecasts, I recognize the unreliability of most of them, and I am reluctant to enter a number into the record at this time.

I don't think we are talking about large sums of money. Even the administration's estimates, which many feel are high for as far as through 1985, are $500 million a year. I think that may well be a reasonable ballpark figure.

That is not a large amount of money as overall things go and yet the overall value to the economy is substantially greater than that. I tend to view this as an investment much as anything else. When we get people to invest in a wind farm or a wood-fired generating plant or any other such things as we have recently financed, they don't see that as a cost, they see it as putting money into something that will bring them long-term returns. It's the whole nature of an investment as against an expenditure.

I think we should look upon this as being an investment on the part of the Nation that will bring greater tax revenues in the future because of productive enterprises being built that were stimulated by this tax credit.

As I noted in my testimony, the total tax revenues to the Treasury over the lifetime of the wind projects we sold exceeds the total outlays that the Treasury might have experienced or the total tax expenditures, to use the technical term, from both the ETC and ITC, so it's a revenue gain instead of a loss.

Mr. FISH. Do you have a comment?

Mr. HUYCK. I would agree with that in form and substance. If you accept the theory that providing incentives to the private sector generates additional revenues at a later time—that seems to be a philosophical underpinning of the administration—then it seems to me the comment made about the net benefit to the Treasury is one that ought to be fairly compelling.

If you had a little different perspective on this area, a different metaphor, one could view it simultaneously as an insurance policy: How much would you pay as an insurance policy to protect yourself against the risk of interruptions of your primary fuel source? What would you pay to Lloyds of London to cover that?

If you were willing to pay something for that, then what is the most effective way to spend that? To give that to the private sector to encourage them to develop alternatives in this sector would be my answer.

Mr. FISH. Mr. Wilson, what we are talking about is a business tax credit of 15 percent that would be extended for 5 years. In your judgment, what is the appropriate level of tax credit needed to equalize the tax treatment of investments for renewable energy systems and the expensing of conventional fuels?

Mr. WILSON. That is another one of those questions you can't win by answering. Let me put it this way: The Senate in 1980, when the crude oil windfall profits tax bill was considered, passed a 20-

percent figure for eligible property through 1990. The conference, because of revenue projections—the Carter administration was projecting very, very high levels—the conference then trimmed them back to 1985 and to 15 percent.

The numbers provided in my testimony relate to solar and wind property only because you limited this hearing to those technologies.

One of the biggest revenue losers or revenue generators of the credit are biomass projects. Biomass and alternative energy projects, some coal, some biomass, some in between; are the big ticket items in that credit. The solar and wind property is relatively small in comparison. So when you talk about the revenue loss you need to split those out and be sure what you are dealing with.

In direct answer to your question, I think most companies that we have talked with feel that a 15-percent credit is appropriate. There is precedent for it, it is working and there is no reason to change that unless you decide to change it for specific technology, for a specific policy issue which this committee might find appropriate.

Mr. FISH. Is it fair to say that the testimony of all the panel has been that the business tax credits have worked well and you would like to see them extended; and second, if we did change, raise the level of tax credit at this point, we might run into the danger of investors holding on until 1985, looking forward to a higher rate?

Let the nods be recorded.

Mr. WILSON. That is a serious possibility.

Mr. FISH. Mr. Chairman, if I could go into one other area briefly. Many States have enacted tax incentives to support renewable energy, and my State is one of the leaders. How effective have these State tax incentives been and I suppose the big question is, Whether they reduce the need for future Federal tax support?

Mr. DANZIGER. I would like to give you one specific example that might be illustrative here. We were involved in a 100-megawatt solar center receiver project where we would anticipate the cost in 1982 to be $400 million. It would be located in California.

California, as you probably know, has a 25-percent energy tax credit scheduled to expire the end of next year. We made the decision that we were not going to rely on that California credit simply because it would in—there are a total of six projects in order to justify the first one, it would effectively bankrupt the State if we in fact took all the credits.

So we felt if California was posed with the problem of suddenly losing on the order of $400 or $500 million in revenue losses due to solar central receivers particularly, that the credit would be repealed or severely curtailed. So we never planned on it. Never planned on having the credit at all.

In addition, you may know that most of the credits are scheduled to expire pretty soon. With the decrease in Federal funds, it is our experience that promoters for large projects, over $25 or $30 million, are not planning on the State credits. They just simply don't believe the States are going to be able to afford to subsidize renewable energy development in their States on a long-term basis for large projects.

Mr. FISH. We have the same issue of certainty which is the argument in favor of extending the tax credit.

Anybody else?

Dr. BLUM. I would like to add one point. It's worth noting that the State tax credits are implicitly also subsidizing the Federal Government because the State tax credit, by reducing your State tax liability, increases your taxable income for Federal purposes by an equal amount. That means that if you are a corporation in a 46-percent tax bracket or an individual investor in a 50-percent marginal tax bracket, roughly half the State tax credit goes to Washington in the form of tax payments.

A number of States feel the flow is supposed to go the other way. That has been a disincentive for the State tax credits.

Mr. FISH. Thank you, Mr. Chairman.

Mr. WOLPE. Thank you, Mr. Fish.

Mr. Sensenbrenner—he is not here.

Mrs. Schneider.

Mrs. SCHNEIDER. I must commend the whole panel for their very explicit testimony, and I will say I have fewer questions than I have answers. I would like to begin with an answer to Mr. Wilson's question in which you expressed concern and couldn't figure out why this administration was willing to go after the business energy tax credit.

Having been very much involved to protect and maintain the survival of those business tax credits, I will tell you that in my discussions with various members of the Administration, their comments were that the business energy tax credits are so insignificant that we don't want to have yet another tax package around.

So I guess you can argue that from both sides. As you say, it is not having that much of a revenue impact. They took the other tack that, well, it's so insignificant, let's brush it away. I share your response, of course, as to its value. It provides the kind of carrot and stick approach necessary to help us have a balanced-energy policy.

Many of your arguments that have been made today I will continue to use to fight for equity and balance in an energy policy. It is quite evident that although we say we will have the free market approach to energy, with the kinds of subsidies and other tax credit availabilities that are around for domestic and non-renewable energy resources, there seems to be almost an effort against conservation and renewables.

So a number of us will continue to fight for that equity.

I would like to raise one question that doesn't relate at all to what we have been discussing, but does fit into the picture of the Federal Government in its role with respect to energy policy. I am wondering what some of you might feel is the role of the Federal Government in any other energy areas beyond providing tax credits or tax incentives?

To what degree do you feel the Congress should be involved in co-opting startup funds or demonstration moneys for various types of energy technologies; that is one example.

Do you think the Federal Government should be involved at all in generating information as to various technologies or retrofitting solutions that are available?

Mostly in the areas of demonstration grants and information and any other roles you might see the Federal Government should be involved in, do you see anything in addition to the tax credits?

Mr. Danziger, would you start?

Mr. DANZIGER. Thank you.

Certainly the Federal Government has significant roles to play in two respects. One is as an information-gathering and dissemination for private industry; second, it is imperative in promotion of projects that certain regulatory barriers or regulatory uncertainties be cleared up by this Congress.

The uncertainty over the Public Utility Regulatory Policies Act and avoided costs on all those other issues are frustrating to deal with. I believe clear direction must be given by this Congress that deregulation of generation of electricity is in fact what this country is all about. The steps were taken but we are seeing in the "fix" bill that imposes certain other regulatory barriers as part of it. I think the perspective of deregulation must be enhanced.

As to the research funding, as you know this country is blessed with magnificent institutions; Jet Propulsion Laboratories and Sandia, to name just a few, and I would love to turn them loose if we could afford it. They can really do the job and they can provide industry with a baseline for achieving the goal of making renewables competitive.

So on a general basis there is no question in my mind that if we can afford it, the research and development funding should absolutely continue. It's a question of cost and do we have the resources to allocate in that direction?

Of paramount importance is to clear up uncertainty of just how private producers sell electricity to public utilities.

Mrs. SCHNEIDER. Thank you.

Anyone else?

Mr. WILSON. I just have a couple of points. The Federal Government has several roles in national defense and national priorities that go unquestioned. These roles generally cost quite a bit of money. We are currently spending quite a bit to create a strategic petroleum reserve and to protect our access to Middle East oil. It just seems a folly, with the money involved in supporting R&D, not to develop new energy resources instead of protecting the older ways of doing business. It just doesn't make sense.

Mrs. SCHNEIDER. Anybody else?

Dr. BLUM. I see several additional roles that are useful for the Federal Government in the energy area. One clearly is the underpinnings, that is, the long-term basic research that is not sufficiently proprietary that any one firm feels it can get an adequate return from investing in it, but overall is tremendously valuable to the Nation as a whole. It is very important for this basic and applied research in the entire energy area to be pursued and pursued aggressively.

Another area in which I think the Government has long had a legitimate role, accepted by administrations of all political coloration, has been information collection and dissemination—making it available, having it be as objective and impartial and as free from apparent orientation towards one side or another as possible.

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I think that objectivity in providing these essential resources is something that the Government ought to provide.

There is another role that arises from the fact that part of investors perception of risk stems from the lack of adequate documented experience with many of these technologies. One need not call gaining experience a demonstration, which is a word that has acquired certain connotations that are viewed as being unacceptable today; perhaps if we called it testing and verification, it would be clearer what the true role is.

There are a lot of things being marketed that people simply don't know how well they work. We need to have an impartial and objective means of testing and evaluating. Tests and verifications can be expensive, of course, but the long run value needs to be viewed in the context of an investment that may be able to lower that risk premium the market demands.

By lowering the risk premium, we may be able to lower the cost of the energy delivered from these systems. The public benefits thereby substantially, each person contributing a small amount for the benefit of the whole—something I think extremely valuable.

Mrs. SCHNEIDER. Mr. Huyck, I can certainly appreciate how you feel sitting at the end of the line, I have the same problems myself.

Mr. HUYCK. As two tail-enders, let me recapitulate something Bob said. I work a lot with major institutional investors as well as advising borrowers. One of the major concerns of institutional lenders has been the regulatory framework in which they function.

The deregulation of this kind of technology, the reliability of that deregulation and the reliability of the framework under which they make a commitment, to the extent efforts like H.R. 6500 and others could be encouraged to stablize this is crucial. We are now 4 years into our lightning war to encourage private investment for development of preferred sources of decline power.

We are not much further along than we were 4 years ago in many areas. If you are going to encourage players in this area, in addition to the normal types of incentives one thinks of, R&D funding, et cetera, it is important to clear the terrain, to give people a reliable roadmap which they can use as a guide for their investment decision. That is the point which I would like to add.

Mrs. SCHNEIDER. Thank you very much. That is all I have, Mr. Chairman.

Mr. FUQUA. Thank you.

Mr. White.

Mr. WHITE. Thank you, Mr. Chairman.

I am going to talk about 1982, and be the devil's advocate for a moment. I would like to address my first question to Dr. Blum and Mr. Huyck as finance people, and maybe others also in that category.

If you were the president, facing the budget deficits we presently have, knowing how they affect the marketplace, and the economy generally, you are well aware of our energy needs, would you continue the energy tax credits as they are now; would you let the marketplace control things or would you put your efforts in the basic institutional governmental research and development and grants programs?

Mr. HUYCK. Sounds almost like ordering in a Chinese restaurant; one from group A, one from group B. My emphasis would be—and I betray my background of having been in the private sector all my life—to foster an evenhanded encouragement in tax credits or other incentives rather than specific guarantee programs or other kinds of direct governmental functions.

If you ask me of those alternatives, to answer your first question, in terms of overall cost in the budget context, the incentives for some of these technologies such as solar and wind, could be critical at this time. These are technologies just beginning to open up. If the freeze hits now it is not just a matter of delaying their development, it could be a matter of permanent loss.

We have seen, for example, a major wind farm project on the west coast, projects that got far along and then ran into a drop in avoided costs and a question as to rescission of energy tax credits. Those questions substantially affected the projected economics of the project and effectively derailed it. Ambiguity can be as fatal as a bad development. I would continue the credits to 1990 and emphasize private sector funding in preference to direct Government programs.

Mr. WHITE. Dr. Blum?

Dr. BLUM. I think on the whole, the answer I would give you is very similar, it's not clear that all of the alternatives you outlined are mutually exclusive. I think as usual a mix is best. The energy tax credits, by providing the driving force for creation help stimulate; the market wouldn't be there if the technologies were not essentially economic.

As I have indicated, you have to have something which already has a pretty good rate of return to have the tax credit then put it up to where it has a risk rate of return that attracts investments.

If it doesn't have a reasonably good rate of return, the tax credit will not convert a rotten apple into a good one. What it will do is put a little polish on the apple that will help sell it and make it attractive.

I think it's critical in serving as a stimulus for the private sector, not only for the projects themselves but for research and development. If I have that choice as you indicated, I would cut back on some of the more expensive and less productive, straight outlays of the Federal Government, as I think is underway. I think many of the direct grant programs are of relatively unproved efficacy.

First, I would want a study with fairly detailed analysis of actual experience to date of some of these, which wouldn't be very expensive, to show which were actually having impact. When I have looked at these in the past, the feeling was that a number of them were costing a great deal and not achieving very much.

I think one would need to look carefully rather than simply indiscriminately, to see which things were paying and which were not. I think the evidence we have is that the tax credit is one of the most cost-effective of the things that are available right now. The overall expenditure for it, to the extent that one views it as an expenditure, is not high.

Let me note, also, that in the financial markets one of the most corrosive things that Government can do is to create vast uncertainty. It's like the proverbial story of what do you do when you

are in bed with an elephant? You sleep very carefully because you are not sure which way it's going to roll.

That is precisely the condition in which people find themselves in the financial markets as they look at the various actions that Government is taking. They are not quite certain what is going to happen. There are all those proposals out on the table. Things keep changing rapidly.

As a result, people tend to sit back and wait because they don't want to make a commitment to something which will suddenly be rendered ineffective, obsolete or useless by a change in Government policy, whether it's regulatory or financial or whatever.

That uncertainty is extremely corrosive and it's making it very difficult to operate. I realize it is inherent in the process, having watched the process for a long time. But to the extent that certainty can be created, it's extremely helpful.

Mr. WHITE. What happens to this program if Congress passes a flat tax rate? Wouldn't that wipe it out?

Dr. BLUM. I think one of the key aspects is that the flat tax rate will greatly diminish the value of deductions.

Mr. WHITE. It would wipe them out, wouldn't it?

Dr. BLUM. It could wipe them out totally. For businesses, I do not believe it would. I do not know how it would affect businesses. But for individual investors, who form a large part of the pool of capital that is available in this country, roughly a third to a half of the capital available for investments, you would find that for many of these enterprises, these investments would not be available to them at all because the deductions would not be there. The tax credit might be.

Mr. WHITE. Then the Government would have to be using straight, specific grants, I presume?

Dr. BLUM. You would find you have ruled out, unless you had another way of structuring the investment, a large part of your investment capital. And you would have yourself a patchwork of things such as we have in the previous law.

Mr. WHITE. Does anyone on the panel have statistics on the percentage of increase in renewable energy that can be attributed to the energy tax credits?

Mr. HUYCK. I will make a brief comment. I have always had trouble in arguing how much can you attribute to this.

I testified across the hall a few weeks ago that a stable regulatory framework much like a predictable tax credit system is a necessary condition but it is not a sufficient condition.

Other than that, I cannot quantify for you the exact impact. There are undoubtedly projects that would move without the energy credit. There are some that will not move ahead even with it. It is very difficult to quantify the gray area because of the other variables inherent in this process. The energy tax credit is just one of several key factors. If you could stabilize all the others we could all get a better fix on this one. I don't think we can pull the red apart from the yellow in a bucket of orange paint. It is difficult to quantify.

Mr. GOODWIN. I am not able to give you a specific answer, but I would like to point to one other factor that makes it difficult to answer questions such as this. We are not, as in other areas of our

economy such as the oil industry, dealing with a small number of companies which can be analyzed and whose actions can be predicted. The renewable energy industry is a decentralized industry.

For that reason, on top of everything else, it is very difficult to predict precisely what specific programs will do. We can simply analyze a model and say that given the predictable behavior of the average investor, we expect that these credits will have a significant impact. But in terms of quantifying the impact, the nature of the industry makes that virtually impossible.

Mr. WHITE. Yes, sir.

Mr. DANZIGER. I would like to be a little more specific, Mr. White.

I believe that we will see exponential growth beginning about 1986 in renewable energy industries if the credit is extended and affirmative commitments are put in place as a part of the extension.

We represent about 15 or 16 Fortune 500 companies that are involved in diversification into the renewable energy field and we have strong reason to believe that we would see massive growth. Putting a percentage on it at this point would be misleading because we are at such a low level right now.

I personally expect a massive increase in the rate of new starts in renewable energy projects.

Mr. WHITE. How would any of you answer the critics of the energy renewable tax credits who say that our Government, and our economy should be based on the marketplace and not on special incentives or special treatment of industries. Let the profit motive control.

Mr. GOODWIN. One response to that question was brought out in the article last Sunday by Dr. Yergin in the Sunday Times magazine. The response is that even if you had a free marketplace functioning now, the time horizons of the private sector versus those of the Nation as a whole are very difficult.

The energy credits are designed in part to give some guidance to what we would like to see our industry look like 20 or 30 years from now. They are designed to get the industry started now, so that when we need it 20 or 30 years from now, it will be in place.

Unfortunately, the private sector looks at a shorter time horizon than 20 or 30 years. For that reason you must retain the credits in order to implement that policy.

Mr. WHITE. Do you feel there needs to be more basic research in Government than we have in this area today?

Mr. DANZIGER. Very clearly, the cost of many of the technologies is going to have to go way below what the goals were just a couple years ago. For example, in photovoltaics, the goal, now defunct, was $1.50 peak watt installed. My own personal evaluation is by the late eighties that price will have to be closer to $1, and there will have to be a lot of basic research to reach the price goals. I believe these technologies will have to reach those.

Mr. WHITE. Thank you, Mr. Chairman.

Mr. FUQUA. Thank you.

Mr. Walker?

Mr. WALKER. No questions at this time, Mr. Chairman.

Mr. FUQUA. Thank you, gentlemen, very much for being here this morning and sharing with us your ideas. Thank you all very much.

Our next panel is Nicholas Loope, president, Solar Energy Industries Association; Robert Mawhinney, president, Acurex Solar Corp.; John Lowe, director, wind energy program, Boeing Engineering & Construction Co.; and James Stevenson, manager of planning and analysis, ARCO Solar Industries.

Mr. Loope, we would be pleased to hear from you.

STATEMENTS OF R. NICHOLAS LOOPE, PRESIDENT, SOLAR ENERGY INDUSTRIES ASSOCIATION, WASHINGTON, D.C.; ROBERT MAWHINNEY, PRESIDENT, ACUREX SOLAR CORP., MOUNTAIN VIEW, CALIF.; JOHN E. LOWE, DIRECTOR, WIND ENERGY PROGRAM, BOEING ENGINEERING & CONSTRUCTION CO., SEATTLE, WASH.; AND JAMES STEVENSON, MANAGER, PLANNING AND ANALYSIS, ARCO SOLAR INDUSTRIES, LOS ANGELES, CALIF., ACCOMPANIED BY DENNIS SCHIFFEL, MANAGER, CORPORATE FINANCE AT ATLANTIC RICHFIELD CO.

Mr. LOOPE. Thank you, Mr. Chairman. On behalf of the Solar Energy Industries Association, I want to thank you for giving us this opportunity to appear before your committee and address the question of expanding the time limits on the business energy tax credits.

If it pleases the committee, I would like to take this opportunity to introduce two members of our board who have accompanied me here today.

On my right is Mr. Frank Ducat of McDonnell Douglas Corp., and a longstanding member of our executive committee activities at the industry association, and at the far left of the table, Mr. Jackson Gourand, president of the Energy Clinic and former Deputy Under Secretary of Energy, who also graced the board of our industry association for the last several years.

Gentlemen, in one word, what is needed with the concept of the business energy tax credit is parity, in price.

When we look at the decisionmaking process that goes on within industry to appropriate and then expend investment for capital sources of either equipment or in the case we are investigating here, the use of generation techniques to save energy within that industry, a detailed analysis goes on by the business community.

The business community establishes a basic hurdle rate for use of all of its discretionary income. How that hurdle rate is evaluated, whether it is on return on equity, return on assets, or return on incremental costs, varies from industry to industry.

But they all share one thing in common and that is that a hurdle rate is established, and any investment that does not equal or exceed that hurdle rate will not be entered into by that corporation.

What we have occurring within the renewable energy and solar industry specifically, when being looked at by any board of directors, and when an operating officer comes forward and proposes to that board to make a capital investment in some energy-generation equipment such as solar equipment in order to save energy in the

process of that company, he is required to show that over a period of time—and capital investment cycles are generally 3, 5, 7, or 10 years in duration—he must show within that horizon that he meets or exceeds that corporation's hurdle rate. This is generally able to be done with the use of solar equipment and other energy-generation equipment as an offset of the incremental cost that would have been realized for expending fossil fuels to run that company's process.

The problem is generally not in the return analysis. The problem is generally in the initial net present value first-year cash position of that company.

Today, because of the tax situation that exists in the United States, the cost of fossil fuels used in producing the goods and services of corporations in this country are allowed to be shown in the cost of goods. These fuels are allowed to be expensed against the taxable income. In effect, when a corporation's at a marginal income tax level of 46 percent, 46 cents of every dollar is saved in terms of nontaxable income.

In the first year of valuation when a large up-front capital investment is made on energy generation or energy conservation equipment such as solar, it is impossible to show a first-year cash position that is in parity with continuing the business in its present state. That is continuing to consume fossil fuels and being able to expense the cost of those fuels.

So even though the investment generally will show a very good return at least equal to the hurdle rate and sometimes better than most hurdle rates, over a 3-, 5-, 7-, or 10-year capital evaluation period, it is never taken forward by the corporation because the first-year cash position is so poor. This is absolutely increased in its severity because of the high interest rates and the poor market position that most corporations find themselves in today and the difficulty of raising capital for improvements that really are bordering on reindustrialization of our industry within this country.

Frankly, what we, the industry association, feel needs to be done within the business energy tax credit is to extend that tax credit. As you gentlemen so foresightively have taken into consideration already, we also believe it is necessary to enhance those tax credits.

We must also look at raising the level those tax credits are at to give a parity position in the first-year analysis which is critical for any capital investment to be made within the industry sectors today. The numbers we have taken a look at, and a question was asked earlier on this, about what level of tax credit increase would be necessary to allow industry to move forward in making investments in energy generation and conservation. We found that that level was approximately 40 percent. When that is coupled with the ITC at 10 percent, you begin to reach a parity position with continued expensing of fossil fuels.

I am sorry that Congressman Fish is no longer here, because he asked a very important question earlier, and that is, if we do enhance the tax credits, what effect might that have on revenue generation to the Federal coffers?

Well, it is my feeling, and I believe the feeling of our association, that tax credits can be shown to be enhancements for revenue generation at the Federal level, not depleters of that revenue. Unfortu-

nately, the Treasury has not broken down the business energy tax credit in the past, but they have broken down the residential energy tax credit and I am sure, as all you gentlemen are aware, that is a substantially higher level. Presently, the Federal tax credit is 40 percent for the use of energy conservation and generation devices at the residential levels. With your indulgence, I would like to use those figures to draw a comparison. In the 1980 report from the Treasury, the amount of retail activity in solar equipment that would be eligible for receipt of the Federal 40 percent tax credit was approximately $1.17 billion. The Federal Treasury reported that $157 million was taken in tax credits. That is approximately 12 percent. That goes to show that the States are really picking up quite a bit of the differential as we heard in some earlier testimony.

If we take a look at a very conservative number, that is, for every retail dollar spent in the United States, approximately 22 cents of that retail dollar finds its way back into the Federal coffers, either as personal income tax, corporate tax, FICA, licensing, et cetera, that $1.17 billion in activities at the retail level relays some $230 million worth of income into the Federal coffers. That is $70 million more than the $157 million granted as tax credits.

In addition to that, in 1980, some 20 million square feet of solar collectors were bought and installed for that $1.17 billion. Using a very conservative, again, a quarter billion Btu's per square foot of collector and an annual basis and that is derived from New York, which is my area of living, also, from that area, from 250 million Btu's per square foot annually, we offset over $32 million of foreign oil purchases required from the 20 million square feet of collectors which were installed for that $1.17 billion. If you add the $32 million to the $70 million alluded to earlier, the total is over $100 million that really derived back into our Federal revenues that we did not have before. I might say that the $32 million offset in foreign oil purchases goes directly to improve our balance-of-trade deficit in the hard goods areas which has been a deficit for the last 6 years and one of the primary reasons for the recessionary activities we find ourselves in now.

The renewable energy industries on the whole and the solar portion of that in particular, I believe, is the type of industry that should be very favored and promoted in terms of activities of not only the Federal, but the State levels, in order to try to enhance its involvement in the private sector. It is an industry which is creating capital both in the private and the public markets. It is an industry that is growing more rapidly than the GNP plus the inflation rate, and it is an industry which is very labor-intensive at the job site. Whether you are a supply-side advocate or Keynesian, any industry which can bring these types of influences into our economy should be favored and favored strongly.

The tax credit is a very traditional method within our system from the public sector to the private sector to encourage movement and direction.In order for the renewable industry, which the business energy tax credit is focused on in particular, to take full advantage of energy generation and conservation technology available today and on the immediate horizon, the tax credit must not only be expanded to 1990 or beyond—and I would recommend you

look at 1992 for two reasons, one is the 10-year capital investment horizon that is the upper limit for most industry evaluation, and two, there are other incentives which run to 1992 in the general energy sphere, but it must be enhanced because parity must exist for the capital investment decision to be made within the business community today. This is especially true if we are to try to encourage and grow in our economy and turn around from the recession that we find ourselves so severely locked into today.

Again, on behalf of the Solar Energy Industries Association, I would like to thank the committee for the opportunity to express our views on this important subject.

[The prepared statement of Mr. Loope follows:]

TESTIMONY OF THE SOLAR ENERGY INDUSTRIES ASSOCIATION, PRESENTED BY R. NICHOLAS LOOPE, PRESIDENT

I am pleased to appear before the Committee today to present the testimony of the Solar Energy Industries Association (SEIA), of which I am the current national President. My name is R. Nicholas Loope and I am an executive officer of Sunworks, Inc., a subsidiary of American Smelting and Refining Co. Many of the Fortune 500 companies are involved in solar energy because they see the future of energy production from this source.

SEIA is a membership trade association representing the interests of the solar business of our nation. We include among our membership producers of solar equipment, research and development interests, marketing interests, and those involved with the installation of solar equipment. We represent companies which produce between 80 and 90 percent of all the solar equipment manufactured in the United States. SEIA has in its membership both large, medium and small companies, with about 85 percent of our members being properly classified as small businesses.

SEIA is in its eighth year of operation and provided many membership services to the 500 members, most of whom are company members. The association is divided into various division units representing the different solar technologies.

INDUSTRY PHILOSOPHY ON GOVERNMENT PROGRAMS ON TAX POLICY

Before I comment directly on incentives for business uses of solar, let me make a brief statement regarding the general philosophy of the solar industry toward government programs and tax policies for solar energy.

Although a few solar companies existed in the United States before the oil crisis of 1973-74, it was not until that time that American business became serious about building a solar industry. From that point on the federal government supported development of technology for renewable energy resources and helped encourage establishment of a privately-financed industry. In the ensuing years there was a build-up in federal support for solar energy research, development and demonstration. The private sector responded by pouring money into the manufacture of solar equipment and marketing systems for the same. As a result, the flat plate collector, photovoltaic, solar thermal energy and wind technologies began to develop a small industry base. The federal government's role in the beginning of this process was, necessarily, substantial and justified.

Now, some technologies have been well developed and are being commercialized or marketed by the private sector, without great need for the commitment of large federal funds for research and development. However, other tehcnologies are still in the research and development stages and have a continued need for federal government involvement.

SEIA supports a solar budget level of $268 million for fiscal year 1983, which would be consistent with the freeze-level of fiscal year 1982 expenditures. Adoption by Congress of a ceiling for energy programs of $4.8 billion in budget authority and $4.5 billion in budget outlays, as contained in the First Budget Resolution, should allow approximately this level for fiscal year 1983.

HISTORY OF SOLAR TAX CREDITS

While the monies authorized and appropriated by Congress for solar research, development and demonstration programs through the Energy Research and Development Administration (ERDA) and more recently through the Department of Energy

(DOE), have been helpful to the industry in developing the technologies, still the most important step the federal government has taken to support solar energy was the enactment of the solar tax credits. The solar industry will always be grateful to the members of Congress for your support of the research and development programs and for your support of the solar tax credits. Your foresight in providing the solar tax credit incentive has proven to be the most sound and effective method for moving solar in the marketplace yet known to the industry.

You will recall that Congress first enacted solar tax credits as part of the Energy Tax Act of 1978, which provided for a residential credit of 30 percent of the first $2,000 expended for a qualified solar installation, and 20 percent of the next $8,000, for a total tax credit of not more than $4,400. For a business installation, which included commercial and industrial installations, the tax credit was 10 percent of the installed cost of the solar system.

In 1980, the Congress amended the solar tax credits in the Windfall Profits Tax Act, so that residential installations received 40 percent of the installed cost up to $10,000, for a maximum tax credit of $4,000. For business installation, Congress increased the tax credit to 15 percent of the installed cost of the system. Foir business applications that produce industrial process heat, this 15 percent energy tax credit may be added to the 10 percent regular investment tax credit to provide a total credit of 25 percent. However, other business applications of solar do not qualify for the regular 10 percent investment tax credit under existing law.

GENERAL VIEWS ON ADMINISTRATION PROPOSAL

SEIA is extremely disappointed that Administration proposed the repeal of the business energy tax credits for renewable energy. Not only would such an action be unwise and economically unsound, it would repudiate the Administration's firm commitment to the tax credits. Industry supported the Administration's efforts to arrive at a lean fiscal year 1982 solar budget because of this tacit endorsement of the tax credit approach to solar incentives. SEIA is heartened, however, by the strong support from Members of Congress for retention of the solar tax credits through letters, resolutions and public announcements. All these have combined to communicate to the solar industry that the tax credits will be retained and that there is some stability left in federal government energy policy.

We extend our deep appreciation to you for that great showing of support and are pleased to note that it now appears that the Administration has dropped the repeal proposal.

SOLAR TAX CREDITS ARE EFFECTIVE AND GENERATE REVENUE

If the Administration's true goal is to eliminate "ineffective subsidies for business," a review is in order because the solar energy tax credit is not ineffective. A careful analysis by the Administration of what the business energy tax credit has done to promote solar energy in commercial and industrial structures will demonstrate that this tax credit has provided significant savings for businesses and has created savings and revenues at the federal level.

Numbers have not been made available from the Treasury Department which would show what percentage of tax credits were taken in 1980 by businesses installing solar. However, if the number of residential credits taken is indicative, less than 12 percent of the applicable retail dollar value was taken in tax credits. It could be claimed that 22 cents out of each retail dollar spent finds its way back to federal coffers in the form of personal income tax, corporate taxes, excise taxes, licenses, FICA payments, etc. The Treasury would be hard pressed to claim that the business energy tax credit is a revenue deficit.

Quite to the contrary, the solar tax credits have proven to be a revenue generator for the federal government in money sent to Treasury by the normal business cycle, and by the amount of fossil fuels that have been offset by the use of solar. If this fossil fuel had been consumed by a business, it would have been deducted from company earnings as a business expense before taxes. Our industry estimates that $1.17 billion were spent at the retail level in 1980 for renewable energy installations. Using the 22 cents per retail dollar figure just noted, the Treasury took in $230 million in taxes as a result of these sales. Internal Revenue Service Reports on the residential credits in 1980 indicate that the total of IRS credits was $157 million. Thus the Treasury actually had a net gain of over $70 million because of this incentive. In addition, in 1980, 20 million square feet of solar collectors were sold, offsetting at today's prices for oil, $32 million in foreign oil purchases. This directly improves the U.S. balance of trade deficits for hard goods.

In a November 1981 report to the Lawrence Livermore Laboratory, "The Cost of Federal Tax Credit Programs to Develop the Market for Industrial Solar and Wind Energy Technologies," the Arthur D. Little Corporation concluded that, "the cost of tax credits to the Treasury is amply repaid to the Nation by the value of the energy saved. . . . in fact, under the high inflation rate scenario, the net present value of the increase in revenue due to the decrease in tax deductible corporate expenses for conventional energy is large enough that the Treasury will actually profit on the tax credit program."

Such contribution can hardly be termed "ineffective". Furthermore, for an Administration that is supply side conscious, there should be the realization that the cornerstone to successful supply side economics is the encouragement of both capital creative enterprises and high employment enterprises, preferably in an industry sector that is rapidly growing.

Solar is all of these. Solar has been growing at over 25 percent per year compounded since 1976. It is extremely labor intensive at the jobsite and it is a highly capital creative industry. Capital formation has been generated from the private sector, both in the form of corporate investment as well as individual investment through the stock market and venture capitalists.

THE SOLAR MARKETING PROCEDURE ANALYZED

Let's look at what happens in marketing commercial applications of solar energy. First, one must realize the ability for businesses to expense the burning of fossil fuels which is, in effect, a 46 percent tax credit. For a corporate operating officer to recommend to his/her Board of Directors that a major investment be made in energy conservation and generation equipment such as solar, that officer must be able to justify that initial investment within the internal rate of return boundaries for that corporation.

When that corporation can continue to operate as it does today, expensing an item at 46 percent tax savings, an incredibly high rate of return would have to be shown to justify an investment such as solar energy equipment.

The 15 percent business energy tax credit, and the 10 percent investment tax credit (ITC) when it is applicable, do not come close to the 46 percent expensing level. For solar to be truly effective as an energy choice, parity in price must exist at the business level. Thus, a 40 percent business energy tax credit for solar, coupled with the ITC that applies to all business applications of solar, would allow parity to exist between solar and fossil fuels. This would allow the operating officers to sell a solar capital improvement project to his/her Board of Directors on the basis of future energy savings coupled with a comparable rate of return on that investment as compared to the present expensing level of fossil fuels.

SOLAR TAX CREDITS SHOULD BE MADE MORE EFFECTIVE AND EXTENDED

Before discussing the need to extend the solar tax credits beyond 1985, I would like to remind the Committe about a problem we have with current IRS rules which do not allow the 10 percent Investment Tax Credit to apply to solar equipment for heating and cooling commerical buildings, or for providing normal service hot water. Thus, solar systems for commerical buildings can only benefit from a 15 percent credit. The solar industry would like to see improvement in the effectiveness of present tax credits for solar through clarification of the applicability of the 10 percent ITC to include all solar installations. This does no injury to the original intent of the Investment Tax Credit legislation, since its real purpose is served in providing incentives for new captial equipment. At the same time, it enhances the present 15 percent business energy tax credit by creating a more equitable treatment of solar energy equipment.

While the solar tax credits have been the most important incentive in the marketing of solar equipment, up to now most installations have taken place in the residential market. The business market for solar, which includes commerical, industrial, and agricultural installations, has been only partially tapped.

This fact stands in sharp contrast with the reality that the largest savings in conservation and fuel costs could be realized in the business sector, the area of greatest energy use. The growing costs of energy are reflected in price increases in every product or service dispensed in the market.

As explained previously, the traditional expensing of fossil fuels in the business community has been a barrier for solar marketing. The 15 percent business energy tax credit assists in closing the comparative gap, but it is only a first step. The inclusion of the 10 percent ITC helps, but has only limited solar business application. Certainly, the broadening of application for the ITC so that it could be combined in

each instance with the business energy tax credit, would help eliminate the economic disparity with fossil fuels.

SEIA has always supported the proposition that the business energy tax credits should be comparable to the present residential tax credit of 40 percent. A 40 percent credit coupled with the 10 percent ITC, would bring parity with the expensing of fossil fuels at approximately 46 percent.

We realize that the national economic climate has changed since the passage of the latest amendments to these tax credits, contained in the Windfall Tax Act of 1980. However, the challenge is before Congress to approve a tax credit level that will provide the necessary incentive to significantly advance the commerical market, and still provide assurance to the Treasury Department that the tax credits will not create an unmanageable revenue loss in its net effect on the economy.

THE IMPORTANCE OF TAX CREDITS IN PLANNING FUTURE SOLAR INSTALLATIONS

The issue before the Committee, however, is what to do about the December 31, 1985 termination date for the solar tax credits. First, let me make it clear that the solar industry does not expect a free ride from the federal government. The solar industry looks to the federal government for a position of fairness, leading to parity in the marketplace. That position of parity has not yet been achieved and if the United States is to pursue the use of alternate energy as one of its energy goals, it will need an industry base to provide that choice for American consumers. Without the tax credits, residential and especially the commercial sectors would show little movement and would probably not survive in most areas of the country.

Therefore, we urge extension of the solar tax credits to 1992. The financing and construction of commerical and industrial solar installations takes considerable time and planning. Thus, it is especially important for business planning cycles that some decisions be made on this issue soon.

The case for extending the solar tax credits may best be illustrated by reviewing the status of the solar thermal industry developing point focus central receiver technology. This technology is ideal for the new economic environment facing U.S. electric utilities. The plants should be economically viable in the range of 100 megawatts capacity, with initial capital costs near $3500/kW (1982 dollars). The construction time for such plants (4 years) is much shorter than for conventional energy plants, and special provisions for them shorten the regulatory process. As a result, these plants lend themselves to financing by third party venture capitalists, and utilities will be able to add capacity in the future without investing their own funds.

The financial community and the solar industry will only be able to take advantage of this opportunity if the current tax credits are extended through the transition period from technology development to commericalization. Because the federal government has seriously cut the solar research and development budget, this transition period is being lengthened. Industrial firms can be expected to take major investment risks in such new technologies only if the government shares that risk in the early introductory phases.

Given present planning horizons for the utility industry, plans developing right now could not be implemented until 1986-87, and it would be too late for the present credits to apply. An urgent need exists to extend the tax credit into the 1990s so that the first generation of commerical solar central receiver power plants receives this benefit during its introductory period. After the mid-1990s, a sufficient number of operating plants will exist to create a substantial indsutrial base, and mass manufacturing of system components will reduce and stablize costs.

A statement issued last fall by five utility companies exemplifies broad support for this position. The Arizona Public Service Company, Southern California Edison Company, El Paso Electric Company, Pacific Gas and Electric Company and Sierra Pacific Power Company prepared a series of recommendations in October 1981, concerning federal government involvement in development of solar thermal central receiver technology. The companies stated that, "We believe the solar thermal central receiver technology has real potential for utility use in the 1990's and beyond." One of four specific recommendations the utilities made was that the federal government, "Continue and extend, through 1995, the business and investment energy tax credits vital to this industry. This will encourage the transfer of central receiver technology to the private sector through third party investors." The utility companies encourage such action now because their planning horizon has already reached the early 1990s, and they want to be able to rely on a favorable investment climate and a solar industry confidently working toward bringing its technology into commercial use. The tax credits are a vital incentive for development of utility-scale re-

newable energy systems, and their existence has already had the desirable impact of gaining serious utility consideration of solar thermal electric technology. By the late 1980s and early 1990s this technology will be proven commercially and rate payers will benefit from the lower cost of energy. Further, government tax credit support will no longer be required.

CONCLUSION

The only sensible approach for the United States today in the energy area is to seek a balanced program encouraging development of all energy forms, including renewable energy. Although this nation has invested over a billion dollars in the research, development and demonstration of renewable energy sources, it is only a fraction of the investment already devoted to many other energy forms. Given the importance of energy to our future, it would be foolhardly to reduce investment in an extremely valuable national resource, renewable energy.

The solar tax credits make good economic sense. The tax credits have had a positive effect in accelerating development of solar markets, with improved sales evident now in the residential market. Even greater potential for energy conservation and energy savings lies in the commercial/industrial market. The present 15 percent business energy credit has promoted solar heating and cooling installations in the commercial/industrial marketplace. However, parity with other energy forms could be achieved if these credits were increased. Realizing current economic constraints, we could suggest the coupling of the Investment Tax Credit of 10 percent with the business energy tax credit, to provide, at least, a 25 percent business energy tax credit for commercial and industrial solar installations. The tax credits must be seen as a stimulus, and not a drain, on the Treasury. The potential of new sources of taxation, from the movement of products from manufacture to marketing, to the new taxes paid by additional employment, should outweigh any fear of unmanageable short-term revenue loss.

Finally, the Senate Finance Committee Tax Reconciliation Bill just proposed July 2nd has already sent a shudder through the solar industry. The provision reducing the basis of property for which investment is taken includes both the investment and the energy credits. The practical economic consequence of this provision is to reduce the value of the renewable energy tax credit by 20 percent. Reducing the depreciation allowance by half the amount claimed as a tax credit will undoubtedly jeopardize the economic viability of projects now being proposed in the private sector by the solar industry for commercial buildings, industrial process heat and electricity generation. The solar industry is relying on these early projects to increase production, which will lower costs and help establish the market for solar technology. If Congress chips away three of the 15 percent tax credit, it will adversely impact these early projects and cast a pall over the solar industry, which is already trying to adjust to the severe solar budget cutbacks. We ask that action be taken to retain the full value of the renewable energy tax credits, in addition to extending them.

Mr. Chairman, and members of the Committee, let me thank you for the opportunity to testify and assure you of SEIA's desire to cooperate with your good work.

Mr. WHITE [presiding]. The next witness is Robert Mawhinney.

Mr. MAWHINNEY. Thank you, Mr. Chairman.

Mr. WHITE. Without objection, the statements of the witnesses will be placed in the record at the point of their testimony.

You may proceed to summarize or addressing your text.

Mr. MAWHINNEY. I would like to thank you for inviting me here to testify on this most important aspect of our business. As the Chairman mentioned, I am the president of Acurex Solar Corp., which is a joint venture between Acurex Corp. and the Phillips Petroleum Co. That venture was formed in 1980 for the express purpose of moving some of the solar technologies that had been developed with Government funding into the commercial marketplace.

Our primary thrust is in systems using parabolic collectors and in systems engineering and development of other applications primarily for generation of electricity and production of industrial process heat.

I am pleased to say we have successfully begun the transformation from an R&D company to one that can deal commercially with this equipment, both in marketing and manufacturing. Our successes in those areas are in no small measure due to the technology development fostered by this committee. In my testimony, I would like to focus on the issue of commercializing technologies such as solar thermal systems and the role of Government in that process.

In 1975, when Acurex Corp. first began its involvement in the solar program of the U.S. Government, Acurex was about a $22 million company, largely Government R&D. In those early projects, Acurex became involved and was one of the leading participants in parabolic trough, dish, and photovoltaic activities. We constructed nine demonstration facilities for both solar thermal and photovoltaics over the period of 1975 to 1982. Many of these facilities were the early pioneers of the solar thermal technology, including Campbell Soup, Coolidge, Johnson & Johnson, and the IEA project.

During those years, we watched the technology evolve and move from the early systems, which were largely hand-tooled, to systems suitable for mass production. We were beneficiaries of the Federal involvement in solar energy technology. In 1979 we felt that the time was correct to move this technology to the commercial sector. We formed this joint venture for the purpose of doing that.

To date, we have become quite confident that our products are commercially viable and competitive when the BEIC is applied. We have announced projects in electrical generation and process heat. We have projected sales opportunities of as much as 250 million over the next several years. A wide range of applications with this technology are possible.

However, despite these early efforts, long-term viability of these technologies will be dependent on a number of issues, many of which were spoken to today. Not the least of these issues are fossil fuel prices, the general economy, regulatory environment, and most importantly, the market acceptance of the technology.

In attempting to market new technologies, we quickly learned there are a number of hurdles. Invariably customers are uneasy with new technologies. We have seen the financial community react by asking for higher rates of return. In our case, the Government R&D program has alleviated some of these uncertainties with the parabolic trough technology. We have as much as 4 years of operation on some of our oldest systems; our newest systems are in their third generation of development. Our project in Spain is truly an operational project in a commercial sense.

Without that record, it would be difficult to market any of these systems.

The second hurdle, of course, in marketing new technology is the cost. Since solar equipment costs include a lifetime of fuel, the systems are dominated by large capital costs. However, these costs are projected to fall as production volume increases. While fossil fuel systems have more balanced equipment costs and O&M costs, all of those factors are expected to increase. So we are converging on an economically viable situation.

The BEIC can add tremendous leverage, not only by offsetting the fossil fuel tax treatment, but also by providing a market stimulus. The credit accomplishes this by raising the cost threshold to

which the system costs must be reduced to compete in the marketplace.

The credit makes it possible to start earlier than we otherwise would. However, our projections of system costs indicate that we will reach a point when our systems can compete successfully against ever increasing fuel costs without additional Federal incentives such as the credit.

Because the BEIC and State credits are formulated with near term completion dates in mind, we have developed business plans designed to operate within these constraints. This is the only posture we can prudently take. We must see our way clear to exist with the current regulation.

We have estimated that with an extremely aggressive and successful sales program over the next 3 years, it should be possible for our company to market its product in a limited number of applications in the post-1985 period without the tax credits.

However even with fullest realization of our cost reduction projections, our sales opportunities will be limited in that period. They will be limited to those customers with high fuel prices.

One might question whether other less well-developed technologies can make that cut at that point. Unanticipated externalities can have a major negative impact on these plans.

Recognizing that parabolic troughs are one of the most commercially advanced renewable technologies, one realizes that the termination of the tax credit at 1985 will be a significant handicap to commercialization of those developing technologies such as parabolic dishes, central receivers and photovoltaics, as well as to increased sales of parabolic troughs.

We have been heavily involved in these advanced development projects and see significant market entry in the late 1980's if the development program of DOE, as contemplated by this committee, is carried forward.

However, it will be extremely difficult to market dishes in a commercial environment without some form of Federal assistance. The same is true of technologies such as central receivers which are usually large and may require a number of years to construct and finally operate. For these technologies I believe it to be quite difficult today to develop a market strategy which would produce completed systems in the time frame of the tax credits.

To the extent this committee has had a major role in fostering these technologies, I view it as well within your responsibility to concern yourself with what happens to the technologies when the Government R&D is completed.

We think it is in the Nation's best interest that these technologies be moved into the private sector.

Mr. Chairman, as a businessman who has staked his career on solar energy, I appreciate the efforts of this committee during the years as we worked together to develop these technologies.

I trust you will continue to have an interest, as we have, in commercializing these technologies and seeing to it they become a significant part of the Nation's energy economy.

Thank you.

[The prepared statement of Mr. Mawhinney follows:]

STATEMENT OF ROBERT C. MAWHINNEY, PRESIDENT, ACUREX SOLAR CORP.

I am pleased to be here this morning to testify before the Energy Development and Applications Subcommittee on the status of the solar thermal industry and specifically the progress that my company, Acurex Solar Corporation, has made in marketing commercial solar energy systems. My nate is Robert C. Mawhinney, I am President of Acurex Solar Corporation, a joint venture of Acurex Corporation and the Phillips Petroleum Company. Acurex Solar Corporation was formed in April of 1980 in an effort to advance on the solar technologies developed by the Department of Energy's Solar Program, and market those technologies in a commercial environment. The technologies which Acurex Solar chose to market were parabolic trough solar thermal systems, as well as systems engineering and developent of photovoltaic systems for utility applications. Our principal thrust has been in the marketing of parabolic trough systems for generation of electricity and the production of steam for use in industrial processes.

I am pleased to be able to report that it appears that Acurex Solar Corporation has successfully begun to make the transition from an R&D organization to a commercially viable enterprise in the manufacturing and marketing of these products. In no small measure this success is due to the technology development fostered by the Federal Government, and particularly this Subcommittee, a technology program which would have been beyond the capability of companies such as Acurex Corporation. In addition, our success has been assisted greatly by the Business Energy Investment Tax Credit, which the Congress originally provided for in 1978 and subsequently modified and broadened in 1980.

In my testimony this morning, I would like to focus on the issue of commercializing technologies such as solar thermal systems and the role of government in that process. Although my remarks will be based on the activities and experiences of my company, in many respects these experiences are common to much of the solar thermal industry and I will endeavor to be as general as possible in relating our experiences to the development of an appropriate Federal role.

In 1975, when Acurex Corporation first began its involvement with the Department of Energy's Solar Program, Acurex Corporation had gross revenues of $22 million and was largely a Government R&D contractor. Acurex became heavily involved in those early days of the program and became one of the leading participants in the parabolic trough, parabolic dish, and photovoltaic activities. Acurex constructed a total of nine demonstration facilities for both solar thermal and photovoltaic programs over the period 1975 to 1982. Many of these are facilities which were the early pioneers of solar thermal technology including such familiar names as Campbell Soup, Coolidge, Johnson and Johnson, and IEA. During the seven years that Acurex was closely associated with these programs, the technology advanced through several evolutionary cycles from early prototype systems, which were largely hand tooled, to systems suitable for mass production.

There is no question but that Acurex and firms like ours were beneficiaries of a major Federal investment in solar energy technology. Such an investment would have been beyond the scope which a company of $22 million could have possibly envisioned or implemented. However, in late 1979, Acurex made a decision that this Government R&D program would be of no long term benefit to ourselves or to the nation if it were not put into a commercial environment. Therefore in the spring of 1980, Acurex Corporation entered into a joint venture with the Phillips Petroleum Company and formed Acurex Solar Corporation. The express purpose of Acurex Solar Corporation is to build on the Government investment in solar R&D and market commercially viable technologies to the industrial and utility sectors.

Acurex Solar's marketing activities to date have made us confident that our products, specifically parabolic troughs, are commercial competitive. Acurex Solar has announced a number of projects for which agreements have been reached for both electric power generation and for the production of industrial process heat. We project sales opportunities over the next several years of over $250 million. Applications for parabolic trough systems range from enhanced oil recovery, to the generation of electricity, and the providing of industrial process heat for use in the food processing industry, the pulp and paper industry and others. However, despite these encouraging early marketing efforts, the long term viability of these technologies will be dependent on a number of issues, not the least of which are fossil fuel prices, the general health of the economy, environmental concerns relating to the use of alternative fuels and most importantly, the market acceptance of the technology.

In attempting to market new technologies, one quickly finds that there are several major hurdles. Invariably customers are uneasy with techologies that are new and unproven. In our case, the Government R. & D. program has at least alleviated

some of this uneasiness through parabolic trough demonstration projects that have been in operation for several years. The oldest of our currently operational systems, Campbell Soup, is well into its fourth year of operation. Therefore, we have a track record and can point with pride to systems such as the IEA project in Almeria, Spain, which as a third generation system, is truly operational in a commercial sense. Without such a track record, I feel it would be extremely difficult to market any systems, as we have found that it has still not been easy despite the existence of these demonstration projects.

The second hurdle which one encounters in marketing new technologies is cost. Solar technologies are inherently capital intensive. Thus, at first they compare poorly with fossil energy systems, which have lower front end capital cost with significant operating costs spread throughout their lifetime. Essentially in solar energy one is forced to pay for all the fuel at the beginning as opposed to expensing it on a year by year basis. Recognizing this fact in 1978, Congress implemented a Business Energy Investment Credit of 10 percent which was subsequently modified in 1980 to a level of 15 percent to partially offset the favorable treatment the tax code gives to fuel-consuming technologies.

In providing for this tax credit, Congress recognized that solar energy has an inherently different cost structure than fossil fuel based energy sources. Looking at the cost components of an energy system, one recognizes that both solar and fossil systems have capital equipment costs, operations and maintenance costs, and fuel costs. The capital equipment cost for solar energy will always be the dominant component but solar energy systems are unique, in contrast to conventional energy systems, in that their capital equipment cost are projected to go down over the next several years as production volumes increase. (These cost projections are no longer based on DOE estimates, but on our own internal corporate estimates of cost of production as a function of increasing production volume.) Although both solar and fossil systems can be projected to have relatively small operations and maintenance costs, the solar energy system has no fuel cost, whereas a fossil energy system faces ever larger and increasing fuel costs.

To put this into perspective, solar energy systems are dominated by large capital costs which are projected to fall while fossil systems have more balanced equipment, O&M and fuel costs all of which are projected to continue to increase. Thus the Business Energy Investment Credit can have tremendous leverage, not only by offsetting the favorable treatment of fossil energy in the tax code but also by providing an early market stimulus. The tax credit accomplishes this by raising the cost threshold to which systems cost must be reduced to compete in the marketplace. The tax credit, therefore, makes it possible to market systems during the transition period before production volumes increase sufficiently to permit major cost reductions. However, if our projections of systems cost reductions are correct, we will reach a point where Acurex Solar's systems can compete successfully against the ever increasing in cost of fossil fuel without additional Federal incentives.

Because the Federal Business Energy Investment Credit and most state credits have been formulated with near-term termination dates, we have developed business plans designed to operate within these limited time-frames. This is the only posture which we, as prudent businessmen, can reasonably take. However, it is clear that Congress should examine the termination date of the Business Energy Investment Credit and decide whether or not this date is, in fact, arbitrary with regard to the state of the renewable energy industry. One can argue at length as to whether the inequities of the tax code justify the indefinite extension of these credits, but even if one chooses to assume that they must terminate at some point, one must look at whether or not the end of 1985 is the correct time.

Acurex Solar Corporation has estimated that with an extremely aggressive and successful sales program over the next three years, it should be possible for our company to market its products in a limited number of applications in the post tax credit period after 1985. Even with full realization of our cost reduction projections, our sales opportunities in the mid-1980's will definitely be limited to a very select group of applications where competing fuel prices are exceedingly high. One must question whether other companies in the parabolic trough field will be able to make this cut off date and still have a marketable product. Unanticipated externalities such as the recent "oil glut" can have major negative impacts on such finely tuned business plans.

Recognizing that parabolic troughs are one of the most commercially advanced renewable energy technologies, one realizes that termination of the credits at the end of 1985 will be a significant handicap to the commecialization and marketing of other developing technologies such as parabolic dishes, central receivers and photovoltaics, as well as to additional sales of parabolic troughs.

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Acurex Solar has been heavily involved in the DOE parabolic dish program and views the parabolic dish as having a potential for significant market entry in the late 1980's if the development program at DOE is continued as is presently contemplated by the Congress. However, even with this R&D development program it will be exceedingly difficult to market dishes in a commercial environment without some assistance in the form of a continued Federal tax incentive. The same is true of central receiver projects which are usually large in scope and which may require several years from date of contract through construction and final operation. For these technologies it is almost impossible today to develop a market strategy which will produce completed systems before the termination of the credit.

To the extent that this Committee has had a major role in fostering the development of these renewable energy technologies, I view it as within this Committee's realm of responsibilities to concern itself with the issue of what happens to these technologies once the Government R&D program has been completed. It is in the nation's and taxpayer's best interest that these technologies and the Government investment in them be capitalized upon by private industry.

Mr. Chairman, as a businessman who has staked his career on solar energy, I have appreciated the efforts of this Committee during these years as we have worked together to develop these technologies and I trust that you will continue to have an interest in the commercialization of these technologies as they become a significant part of the nation's energy economy. I thank you for the opportunity to present my views and I will be happy to answer any questions you may have.

BIOGRAPHICAL SKETCH OF ROBERT C. MAWHINNEY

Mr. Mawhinney has been the President of Acurex Solar Corporation (ASC) since its founding in April, 1980. ASC is a joint venture of Acurex Corporation and the Phillips Petroleum Company. He played a key role in structuring the joint venture agreement and has been particularly active in the company's strategic planning efforts to direct its solar energy technologies into the commercial sector. Under his direction ASC has entered into several large-scale private sector projects with California utilities and industrial concerns.

Prior to the formation of the joint venture, Mr. Mawhinney was Associate General Manager of Acurex Corporation's Alternative Energy Division. In this position he managed Acurex's solar energy development work for the Department of Energy. He joined Acurex in 1975 after serving as Senior Staff Engineer with MB Associates, San Ramon, California.

Mr. Mawhinney holds a Master's Degree in Mechanical Engineering and has been involved in a variety of professional engineering activities over the past twenty-three years, including several years as an officer in the U.S. Navy.

Mr. FUQUA [presiding]. Thank you.

Mr. Lowe, we are glad to have you back again.

Mr. LOWE. Thank you, Mr. Chairman. I am director of Wind Energy programs for Boeing Engineering and Construction Co. I have been responsible for Boeing's involvement in Wind Energy projects during the past 6 years.

We at the Boeing Co. appreciate the opportunity to comment on the vital issue of business energy tax incentives for alternate energy technologies, and specifically, the energy tax credit.

Boeing has been deeply involved for 8 years in the development of alternate energy resources, including wind, solar thermal, alcohol fuels, sea wave, photovoltaics, waste-to-energy, and cogeneration programs. While we have a strong vested interest in many energy forms, we believe we are particularly qualified to address the wind energy-portion of the spectrum as it relates to large wind turbines (over 1.0 megawatt) for commercial power application. My comments today will concentrate on that area.

Under Government contract, we are currently testing three 2.5-megawatt MOD-2 wind turbines at Goldendale, Wash. We are also conducting tests on single MOD-2 R&D units at Medicine Bow,

Wyo., for the Bureau of Reclamation, and in Solano County, Calif., for Pacific Gas and Electric.

In the area of more advanced wind turbines, we are in the detail design phase of a federally funded program on the 7.2-megawatt MOD-5 wind turbine. This program lags the MOD-2 by about 3 to 4 years.

Because of the status of these programs, we have not yet been able to take advantage of the energy tax credits. We would like to see them extended now that we are on the threshold of commercial production.

In the long run, large wind turbines will compete with other energy sources, unaided by special incentives such as this energy tax credit. As the technology is developed to a higher level of confidence and maturity and as nonrenewable resources are depleted, we believe wind systems, as exemplified by the MOD-5, will take a substantial foothold in the marketplace.

The front end of that process, as with any new product technology, is risky and requires substantial investment.

Although our wind turbine tests are going well, there still remain substantial risks in bringing these machines into commercial use. We are in serious discussions with entrepreneurs who would be willing to assume these risks provided the financial incentives are there.

The costs and performance of these second-generation wind turbines are such that the 15-percent energy tax credit is essential to provide these financial incentives. With the tax credit, the cost of electricity of these small (less than 80MW) wind parks is reduced approximately 30 percent. This puts us in a competitive position with nonrenewable energy sources in certain areas of the United States (for example, Hawaii, California). Without the tax credit, we are not yet competitive.

The applicable legislation currently in effect will expire on December 31, 1985. It requires that the buyer's wind turbines be in place by that date in order to qualify.

This is simply not enough time to complete the required testing at Goldendale, negotiate contracts, and produce and install large wind turbines in any significant quantities. The delivery cycle for the first unit is approximately 2 years, due to lead times for rotors, gearboxes and other components.

This puts us into late 1984 before the first units can be produced. With our production capability forecasts of about two a month, not enough units can be produced before the end of 1985 to take advantage of needed cost reductions available as production quantity increases.

We should have time to produce about 50–100 machines to achieve cost goals. At two-a-month production rate, this would run us into 1987 or 1988, about the time the more efficient 7.2-megawatt MOD-5 might come on-line.

At least a 3-year extension of the energy tax credit then is appropriate and it would be better if it were five. This would provide some margin for unexpected delays of delivery schedules. As one might expect, there are rather severe penalties on the manufacturer for deliveries not made before expiration of the tax credit.

While we believe the above extension is vital, the next best alternative would be a redefinition under the tax code of the event which qualifies an asset for the credit.

We suggest an approach providing for qualification of the asset if a firm sales contract for its manufacture and installation has been executed by the expiration date. Without actually altering the date, this change would have the equivalent effect of extending the qualification period through the production time period.

I would now like to briefly address the issue of the energy tax credit's effect on Federal tax revenues. First, to our knowledge, no revenues have been lost to date on large wind turbines in that none have claimed the credit. All sales to date have been to the U.S. Government or other nonqualifying buyers.

Second, all the near-term commercial opportunities we are diligently pursuing are tax credit-dependent. Therefore, no tax base would otherwise be created and no revenues lost.

In fact, the absence of these projects in itself represents a loss of revenues since, other than the subject credits, additional tax base would result from wind parks in this decade.

Third, the credits potentially applicable to yet unidentified wind turbine projects during the qualification period are similarly not "lost revenues" because that tax base won't be created if the nearer term projects don't precede it.

Lastly, the tax base, which wind power will create in the 1990's and beyond, can only be enhanced and enlarged by an earlier start.

The Boeing Co. has made a substantial investment in renewable energy resources in the hope that we can contribute to broadening the base of energy alternatives, and also eventually make a profit.

Extension of the energy tax credit is essential to compensate for initially higher costs and risks of this emerging source of power.

We believe that there is a potential market which will bring in tax revenues far in excess of initial costs to the Government.

Thank you very much, Mr. Chairman. We appreciate the opportunity to appear and express our views.

[The prepared statement of Mr. Lowe follows:]

STATEMENT OF JOHN E. LOWE, DIRECTOR, WIND ENERGY PROGRAMS, BOEING ENGINEERING AND CONSTRUCTION CO.

My name is John Lowe. I am Director of Wind Energy Programs for Boeing Engineering and Construction Company and have been responsible for Boeing's involvement in wind energy projects during the past six years.

We at the Boeing Company appreciate the opportunity to comment on the vital issue of business energy tax incentives for alternate energy technologies and, specifically, the energy tax credit. Boeing has been deeply involved for eight years in the development of alternate energy resources, including wind, solar thermal, alcohol fuels, sea wave, photovoltaics, waste-to-energy and co-generation programs. While we have a strong vested interest in many energy forms, we believe we are particularly qualified to address the wind energy portion of the spectrum as it relates to large wind turbines (over 1.0 megawatt) for commercial power application. My comments today will concentrate on that area.

Under government contract, we are currently testing three 2.5 megawatt MOD-2 wind turbines at Goldendale, Washington. We are also conducting tests on single MOD-2 R&D units at Medicine Bow, Wyoming for the Bureau of Reclamation, and in Solano County, California, for Pacific Gas and Electric. In the are of more advanced wind turbines, we are in the detail design phase of a federally funded program on the 7.2 megawatt MOD-5 wind turbin. This program lags the MOD-2 by about three to four years. Because of the status of these programs, we have not yet

been able to take advantage of the Energy Tax Credits. We would like to see them extended now that we are on the threshold of commercial production.

In the long run, large wind turbines will compete with other energy sources, unaided by special incentives such as this Energy Tax Credit. As the technology is developed to a higher level of confidence and maturity and as non-renewable resources are depleted, we believe wind systems, as exemplified by the MOD-5, will take a substantial foothold in the marketplace. The front-end of that process, as with any new product technology, is risky and requires substantial investment.

Although our wind turbine tests are going well, there still remain substantial risks in bringing these machines into commercial use. We are in serious discussions with entrepreneurs who would be willing to assume these risks provided the financial incentives are there. The costs and performance of these second generation wind turbines are such that the 15 percent energy tax credit is essential to provide these financial incentives. With the tax credit, the cost of electricity of these small (less than 80MW) wind parks is reduced approximately 30 percent. That puts us in a competitive position with non-renewable energy sources in certain areas of the United States (e.g., Hawaii, California). Without the Tax Credit, we are not yet competitive.

The applicable legislation currently in effect will expire on December 31, 1985. It requires that the buyer's wind turbines be in place by that date in order to qualify. This is simply not enough time to complete the required testing at Goldendale, negotiate contracts, and produce and install large wind turbines in any significant quantities. The delivery cycle for the first unit is approximately two years, due to lead times for rotors, gearboxes and other components. This puts us into late 1984 before the first units can be produced. With our production capability forecasts of about two a month, not enough units can be produced before the end of 1985 to take advantage of needed cost reductions available as production quantity increases. We should have time to produce about 50 to 100 machines to achieve cost goals. At two a month production rate, this would run us into 1987 or 1988, about the time the more efficient 7.2 megawatt MOD-5 might come on line. At least a three year extension of the Energy Tax Credit then is appropriate and it would be better if it were five. This would provide some margin for unexpected delays of delivery schedules. As one might expect, there are rather severe penalties on the manufacturer for deliveries not made before expiration of the tax credit.

While we believe the above extension is vital, the next best alternative would be a redefinition under the tax code of the event which qualifies an asset for the credit. We suggest an approach providing for qualification of the asset if a firm sales contract for its manufacture and installation has been executed by the expiration date. Without actually altering the date, this change would have the equivalent effect of extending the qualification period through the production time period.

I would like to briefly address the issue of the Energy Tax Credit's effect on the Federal tax revenues. First, to our knowledge, no revenues have been lost to date on large wind turbines in that none have claimed the credit. All sales to date have been to the U.S. Government or other non-qualifying buyers. Secondly, all the near term commercial opportunities we are diligently pursuing are tax credit-dependent. Therefore, no tax base would otherwise be created and no revenues lost. In fact, the absence of these projects in itself represents a loss of revenues since, other than the subject credits, additional tax base would result from wind parks in this decade. Thirdly, the credits potentially applicable to yet unidentified wind turbine projects during the qualification period are similarly not "lost revenues" because that tax base won't be created if a nearer term projects don't precede it. Lastly, the tax base, which wind power will create in the 1990's and beyond, can only be enhanced and enlarged by an earlier start.

The final area I will address is the relevance of all these concerns to other renewable energy technologies. The greatest incentive of the tax credits is for energy sources which are at the critical juncture of commercial economic viability, such as wind turbines.

In summary, the Boeing Company has made a substantial investment in renewable energy resources in the hope that we can contribute to broadening the base of energy alternatives, and also eventually make a profit. Extension of the Energy Tax Credit is essential to compensate for initially higher costs and risks of this emerging source of power. We believe there is a potential market which we will bring in tax revenues far in excess of initial costs to the government.

BIOGRAPHICAL SKETCH OF JOHN E. LOWE

Mr. Lowe is presently Director, Wind Energy Programs, for Boeing Engineering and Construction Company (BEC). He has been in BEC since it was first formed in 1974. For the last six years, he has been responsible for the acquisition and execution of wind energy related business from U.S. and foreign governments, as well as public and private utilities. He directs the efforts of about 150 people, most of whom are engaged in contracted work. Other activities associated with the development of this alternative energy source include direction of Marketing, Sales, Engineering, Research, and interface with Government/Industrial Contractors. He has a Business Manager to handle financial, contractual, and other necessary business management functions.

Prior to his current assignment, he was Program Manager, Solar Energy System, BEC, where he worked closely with ERDA, EPRI, and utilities in developing IR&D, proposals, and new business related to solar power. His first assignment in BEC was as Technical Staff manager responsible for identification, planning, and conducting appropriate energy research programs, and for fulfilling the BEC requirements for Technical Staff resources.

Before coming to BEC, Mr. Lowe was Chief of Technical Staff in BAC on a number of programs including SCAD (now ALCM), Defense Missile Systems, and Space Shuttle. He was promoted to supervision in 1960 where he was a manager in Structures Technology.

Mr. Lowe's employment with the Boeing Company has included engineering experience in the fields of systems analysis, structural/stress analysis, and preliminary design. His assignments have included DynaSoar, Hardsite Defense Systems, Space Systems, Defensive Missile Systems, BOMARC, and the B-52 Program.

Mr. Lowe joined The Boeing Company in 1950 after graduation from the University of Nebraska with a BS in Civil Engineering. He also completed post-graduate work in Aeronautical Engineering at the University of Washington while working on missile systems projects in 1958.

Mr. FUQUA. Thank you, Mr. Lowe.

Mr. Stevenson.

Mr. STEVENSON. Mr. Chairman, members of the committee, I am James Stevenson, manager of planning and analysis at ARCO Solar Industries.

I have been with ARCO Solar Industries for 2 years. Prior to that, I performed various assignments in a similar capacity for Atlantic Richfield Co.

I would also like to introduce Dr. Dennis Schiffel, manager of corporate finance at Atlantic Richfield Co., responsible for project financing. He was formerly associated with ARCO Solar Industries and the Solar Energy Research Institute.

I have a prepared statement but in the interest of time, I would like to highlight comments from that statement.

Mr. FUQUA. We will make your statement part of the record in its entirety.

Mr. STEVENSON. ARCO Solar Industries is involved in a variety of renewable resource and energy-saving activities, the majority of which are solar-related. Our major activity is in the area of photovoltaic research, manufacturing, and marketing.

Our Camarillo plant is generally recognized as the world's first automated photovoltaic facility. Our photovoltaic manufacturing and marketing activities currently employ approximately 600 people, the majority of whom work in southern California. In addition, we have a group, ARCO Powers Systems, involved in high-temperature thermal applications.

ARCO Solar Industries is one of the nine operating divisions of Atlantic Richfield Co., which is headquartered in Los Angeles, Calif.

ARCO Solar is pleased you have extended an invitation to present our views on the role of business incentives in the development of renewable energy technologies.

For the record, we would like to acknowledge the leadership that this subcommittee has demonstrated in the area of renewable energy. The subcommittee was among the first Government bodies to recognize photovoltaic's significant potential contribution to the Nation's energy needs.

Your actions have facilitated the growth of a potentially major new domestic industry that can contribute to the Nation's economy and employment, and offer the promise of increased exports. Your early support of research and technology on photovoltaic and high termperature thermal components was a major contribution to the achievements in these fields to date. These are two of the field in which we are now involved.

The industry now has reached the stage in its development where your positive action toward the extension and enhancement of the business energy tax credit will, we believe, result in the continued rapid development and world leadership of U.S. companies in the renewable energy industry.

We feel business incentives are the most important assistance the Government can provide to stimulate renewable technology development and use.

Our view of appropriate business incentives for our industry is that they must meet several criteria. First, they should stimulate balanced private-sector activity throughout the necessary technical development and commercialization phases.

Second, they should be stable and sufficiently long term to allow for proper planning.

Third, they should find the greatest utilization in those areas of the country that have the greatest need as determined by market forces.

Fourth, they should be administratively efficient and equitably available.

Finally, they should come into play when some form of market efficiency test has been passed. We believe a combination of investment tax credits, business energy tax credits, and ACRS meet these criteria. Foremost among these business incentives are the business energy tax credits.

The photovoltaics division of the Solar Energy Industries Association stated its views regarding the importance of business incentives in testimony presented during your fiscal year 1983 authorization hearings on March 16 of this year.

The extension and enhancement of the U.S. Federal tax credit was the primary need of the industry presented at these hearings.

As a company, ARCO Solar made its views known regarding the importance of Federal energy business tax credits before the Subcommittee on Energy Research and development of the Senate Energy Committee in hearings held last fall. In those hearings, a major emphasis was on foreign marketing.

In the early years of work on the development of this technology and industry, many observers saw foreign markets as a means of building a successful domestic manufacturing industry and providing incentives for further technical development at this stage of

the industry's development. However, as noted at some length in last fall's Senate hearings, international marketing of new U.S. manufactured energy products overseas is very difficult in the absence of the experience, infrastructure, and U.S. examples offered by a domestic market.

Without this domestic market experience, U.S. companies are and will be increasingly disadvantaged. Our foreign competition is composed of substantial companies. Their Governments are supporting their efforts using means that are in keeping with their own economies, legal systems, and traditions.

The fundamental point we have made in prior testimony before congressional committees bears repeating. They key to the further development and commercialization at home and abroad of renewable energy technologies by U.S. manufacturers is cost reduction in both manufacturing and applications.

This cost reduction can best be stimulated by extending the existing 15 percent renewable energy tax credit. Successful commercial sales could be more effectively stimulated by increasing the business energy tax credit to 30 percent, for a 5-year period, and then phasing down to 15 percent for a few years, if it was needed.

Sales will be stimulated by lower costs stemming from the energy tax credit. Increased sales will promote increased visibility, experience, and hence, acceptability.

The continued successful development and use of renewable energy systems depends on their acceptance in this marketplace. Increased sales and use will provide additional experience that should alleviate future user/buyer concern and stimulate further technical advances.

At present, many investors or customers view the capital cost of this technology as too high compared with standard fossil fuel generation systems. In addition, there is concern about the operation and maintenance costs of systems intended to have very long useful lives.

Even though the cost of fuel for these systems is "free," the absence of experience regarding the operation and maintenance costs and the high capital costs makes the renewable systems seem too much of a risk in relation to their potential return.

An extension of the tax credit will offer time to acquire additional data on operation and maintenance costs, and time for corresponding improvement in design and materials to be developed.

Cost reduction of the basic equipment through technical advances provided by market opportunities that the tax credits offers, combined with this data, should substantially reduce the risk perceived by investors.

The exact length of an extension of the existing credits is difficult to recommend at this time for just these reasons. The date of 1990 has been suggested. At this time, we see that as a positive development. But we cannot argue at this time for that precise year or one a few years earlier or later.

Our products are new and they have long lives associated with them.

We and our customers, need data from the experience markets presented by the tax credits will provide to make that determination as well as many others.

For us and others in our industry, an increase in the Federal tax credit from 15 percent to 30 percent for renewable energy systems and an extension of the credits for a period of 5 years would be a wise investment for this Congress to make.

It will be vital to the development of a new energy industry, including related jobs and economic activity. But perhaps most importantly, it offers another tool available to this Government to reduce our dependence on imported fossil fuel for the generation of electricity.

It also offers the best prospect of a positive balance of trade in renewable energy technology and products. Given the small size of the photovoltaic industry and its current export-oriented nature, we believe the cost to the Treasury would be small for extending the current or enlarging the business energy tax credit. It is exceptionally important to stimulate rapid industry growth now if significant benefits are to be obtained by the late 1980's and early 1990's.

However, we recognize the realities of the current national economic situation and acknowledge and accept the need for acting responsibly in the current Federal budgetary situation as well. An extension of the existing credit would itself represent a very positive action.

In conclusion, ARCO Solar is very encouraged by the understanding of the current stage of development and the needs of our industry that these hearings by your committee demonstrate.

In the very early days of this subcommittee's consideration of the national role in support of these technologies, ARCO Solar managers presented their views on various aspects of the programs under consideration.

ARCO Solar has for the most part drawn on our own resources to develop our company. But we have recognized the many positive aspects of your efforts in support of our industry.

Our attention has been focused on the marketplace in which we must compete and develop. The market in its several forms and many locations guides not only our sales efforts, but it provided the challenge, stimulus and discipline for our research and development work.

We are confident that we and other U.S. companies can continue to compete successfully in that marketplace.

Therefore, we are very encouraged that you recognize that extending market opportunities or enhancing the commercial tax credits is proper to consider at this time. They represent the most effective and efficient means for both American industry and American Government to continue the rapid development of domestic industry so it will remain an international leader and make its contribution to our energy and economy in the future.

Business incentives, including the investment tax credit, ACRS and the current 15 percent renewable energy tax credit, are very important to our industry. We support an extension of the current 15 percent renewable energy tax credit beyond the current expiration date of 1985.

We strongly recommend that you consider the enhancement of that credit to 30 percent for the next 5 years.

Thank you very much for inviting us and considering our views. Dr. Schiffel and I will be pleased to respond to any questions you might have.

[The prepared statement of Mr. Stevenson follows:]

PREPARED STATEMENT OF JAMES P. STEVENSON

Chairman Fuqua, Mr. Fish, members of the committee, good morning. My name is James Stevenson, and I am manager of Planning and Analysis at ARCO Solar Industries. I have been with ARCO Solar Industries for two years. Prior to that, I performed various assignments in a similar capacity for Atlantic Richland Company.

I would also like to introduce Dr. Dennis Schiffel, manager of Corporate Finance at Atlantic Richfield Company, responsible for project financing. He was fromerly associated with ARCO Solar Industries and the Solar Energy Research Institute.

ARCO Solar Industries is involved in a variety of renewable resource and energy saving activities, the majority of which are solar related. Our major activity is in the area of photovoltaic research, manufacturing and marketing. Our Camarillo plant is generally recognized as the world's first automated photovoltaic facility. Our photovoltaic manufacturing and marketing activites currently employ appoximately 600 people, the majority of whom work in southern California. In addition, we have a group, ARCO Power Systems involved in high-temperature thermal applications. ARCO Solar Industries is one of the nine operating divisions of Atlantic Richfield Company, which is headquartered in Los Angeles, California.

ARCO Solar is pleased you have extended an invitation to present our views on the role of business incentives in the development of renewable energy technologies.

For the record, we would like to acknowledge the leadership that this subcommittee has demonstrated in the area of renewable energy. The subcommittee was among the first government bodies to recognize photovoltaic's significant potential contribution to the nation's energy needs. Your actions have facilitated the growth of a potentially major new domestic industry that can contribute to the nation's economy and employment, and offer the promise of increased exports. Your early support of research and tax credits on photovoltaic and high temperature thermal components was a major contribution to the acnievements in these fields to date. These are two of the major renewable energy fields in which we are involved.

The success of your initial research and development efforts in working with the private sector to development photovoltaic and high-temperature thermal technologies is measured by general recognition of U.S. companies as world leaders in the renewable energy industry.

The industry has now reached the stage in its development where your positive action toward the extension and enhancement of the business energy tax credit will, we believe, result in the continued rapid development and world leadership of U.S. companies in the renewable energy industry. We feel business incentives are the most important assistance the government can provide to stimulate renewable tax credits development and use. Our view on appropriate business incentives for our industry is that they must meet several criteria.

First, they should stimulate balanced private sector activity throughout the necessary technical development and commercialization phases.

Second, they should be stable and sufficiently long term to allow for proper planning.

Third, they should find the greatest utilization in those areas of the country that have the greatest need as determined by market forces.

Fourth, they should be administratively efficient and equitably available.

Finally, they should come into play when some form of market efficiency test has been passed. We believe a combination of investment tax credits, business energy tax credits, and ACRS meet these criteria. Foremost among these business incentives, are the business energy tax credits.

The Photovoltaics Division of the Solar Energy Industries Association stated its views regarding the importance of business incentives in testimony presented during your Fiscal Year 1982 Authorization hearings on March 16 of this year. The extension and enhancement of the U.S. federal tax credit was the primary need of the industry presented at these hearings.

As a company, ARCO Solar made its views known regarding the importance of federal energy business tax credits before the Subcommittee on Energy Research and Development of the Senate Energy Committee in hearings held last fall.

In those hearings, a major emphasis was on foreign marketing.

In the early years of work on the development of this technology and industry, many observers saw foreign markets as a means of building a successful comestic manufacturing industry and providing incentives for further technical development at this stage of the industry's development.

However, as we noted at some length, in last Fall's Senate hearings, international marketing of new U.S.-manufactured energy products overseas is very difficult in the absence of the experience, infrastructure, and U.S. examples offered by a domestic market. Without this domestic market experience, U.S. companies are and will be increasingly disadvantaged. Our foreign competition is composed of substantial companies. Their governments are supporting their efforts using means that are in keeping with their own economies, legal systems, and traditions.

The fundamental point we have made in prior testimony before Congressional committees bears repeating. The key to the further development and commercialization at home and abroad of renewable energy technologies by U.S. manufacturers is cost reduction in both manufacturing and applications. This cost reduction can best be stimulated by extending the existing 15 percent renewable energy tax credit. Successful commercial sales could be more effectively stimulated by increasing the business energy tax credit to 30 percent, for a five year period, and then phasing down to 15 percent for a few years, if it was needed.

Sales will be stimulated by lower costs stemming from the energy tax credit. Increased sales will promote increased visibility, experience, and hence, acceptability.

The continued successful development and use of renewable energy systems depends on their acceptance in this marketplace. Increased sales and use will provide additional experience that should alleviate future user/buyer concern and stimulate further technical advances.

At present, many investors or customers view the capital cost of this technology as too high compared with standard fossil fuel generation systems. In addition, there is concern about the operation and maintenance costs of systems intended to have very long useful lives. Even though the cost of fuel for these systems is "free", the absence of experience regarding the operation and maintenance costs and the high capital costs makes the renewable systems seem too much of a risk in relation to their potential return.

An extension of the tax credit will offer time to acquire additional data on operation and maintenance costs, and time for corresponding improvement in design and materials to be developed. Cost reduction of the basic equipment through technical advances provided be market opportunities that the tax credits offers, combined with this data, should substantially reduce the risk perceived by investors.

The exact length of the extention of the existing credits is difficult to recommend at this time for just these reasons. The date of 1990 has been suggested. At this time we see that as a positive development. But we cannot argue at this time for that precise year or one a few years earlier or later. Our products are new and they have long lives associated with them. We and our customers, need data from the experience markets presented by the tax credits will provide to make that determination as well as many others.

For us and others in our industry, an increase in the federal tax credit from 15 to 30 percent for renewable energy systems and an extension of the credits for a period of five years would be a wise investment for this congress to make. It will be vital to the development of a new energy industry, including related jobs and economic activity. But perhaps most importantly, it offers another tool available to this government to reduce our dependence on imported fossil fuel for the generation of electricity. It also offers the best prospect of a positive balance of trade in renewable energy technology and products. Given the small size of the photovoltaic industry and its current export oriented nature, we believe the cost to the Treasury would be small for extending the current or enlarging the business energy tax credit. It is exceptionally important to stimulate rapid industry growth now if significant benefits are to be obtained by the late 1980's and early 1990's.

However, we recognize the realities of the current national economic situation and acknowledge and accept the need for acting responsibly in the current federal budgetary situation as well. An extension of the existing credit would itself represent a very positive action.

In conclusion, ARCO Solar is very encouraged by the understanding of the current stage of development and the needs of our industry that these hearings by your committee demonstrate. In the very early days of this subcommittee's consideration of the national role in support of these technologies, ARCO Solar managers presented their views on various aspects of the programs under consideration. ARCO Solar has for the most part drawn on our own resources to develop our company. But we have recognized the many positive aspects of your efforts in support of our industry.

Our attention has been focused on the marketplace in which we must compete and develop. The market in its several forms and many locations guides not only our sales efforts, but it provides the challenge, stimulus and discipline for our research and development work. We are confident that we and other U.S. companies can continue to compete successfully in that marketplace. Therefore, we are very encouraged that you recognize that extending market opportunities or enhancing the commercial tax credits is proper to consider at this time. They represent the most effective and efficient means for both American industry and American government to continue the rapid development of domestic industry so it will remain an international leader and make its contribution to our energy and economy in the future.

Business incentives including the investment tax credit, ACRS and the current 15 percent renewable energy tax credit are very important to our industry. We support an extension of the current 15 percent renewable energy tax credit beyond the current expiration date of 1985. We strongly recommend that you consider the enhancement of that credit to 30 percent for the next five years.

Thank you very much for inviting us and considering our views. Dr. Schiffel and I will be pleased to respond to any questions you might have.

BIOGRAPHY OF JAMES P. STEVENSON

ARCO Solar Industries, Los Angeles, California. Manager of Planning and Analysis. Currently managing all planning and activities associated with Solar division.

ARCO Petroleum Products Company, Los Angeles, California. Manager, Environmental Analysis. Major responsibilities included developing a 5-10-20 year forecast of major elements of the petroleum industry incluidng supply and demand for finished products.

Atlantic Richfield Company, Los Angeles, California. Profit Planning Manager—Planning & Control. Responsible for coordination of Division's product pricing and raw material acquisition programs as they are affected by Department of Energy regulations.

Atlantic Richfield Company, Los Angeles, California. Analyst Specialists. Coordinated profit forecasting and analysis for Division's monthly profit estimate and budgeting process.

Education: MBA 1972, Oregon State University. Emphasis: Financial Administration. BS 1970, Purdue University. Major: Agricultural Economics.

BIOGRAPHY OF DENNIS D. SCHIFFEL

Experience: Atlantic Richfield.—Mr. Schiffel currently is manager of corporate finance in ARCO's Treasury Department. Previously with ARCO Solar Industries and ARCO Ventures Company, he was involved in planning and budgeting activities including serving as manager of strategic planning, manager of photovoltaic and high technology planning, and manager of planning and budgeting for the residential/commerical group.

Solar Energy Research Institute.—Prior to joinng ARCO, Mr. Schiffel spent two and one half years at SERI. While at SERI he served concurrently as branch chief for policy analysis and as branch chief for institutional and environmental assessment. He also served as manager for policy, planning and development, the chief planning and budgeting officer for SERI.

National Science Foundation.—At NSF Mr. Schiffel served as a senior policy analyst. He worked extensively on issues involving federal policy and R & D/technological innovation. He worked with a number of federal agencies such as NASA, OSTP and the Commission on (materials) Supplies and Shortages.

Education: B.S. Economics and Statistics, The Ohio State University M.B.A., Finance, Indiana University Ph.D. (M.A.), Economics, Claremont Graduate School J.D., Law, The George Washington University.

Other: Mr. Schiffel has taught at such institutions as the Ohio State University, California Polytechnic University and the George Washington University. He also was division chief for public policy economics at Battelle Memorial Institute. He is the author of a number of papers on technological innovation.

Mr. FUQUA. Thank you very much, Mr. Stevenson.

We will leave the record open for statements by members of the subcommittee and also include the text of other witnesses that were unable to testify today in person.

I don't aim this at any individual person, but you may answer if you are so inclined. The administration is considering repeal of the tax credits that are on the books and they assert that decontrol of oil and gas prices justifies elimination of these incentives by creating a free market for energy.

My question is, do you believe that higher energy prices are sufficient incentives by themselves to justify the new investments by industry in renewable technologies, and also, what factors have the present interest rates played in the commercialization of renewable energy technologies?

Mr. LOOPE. Mr. Chairman, certainly an argument which has been placed forward in these halls on several occasions is just that and it has been responded to by industry, I think vigorously, that parity does not exist by any stretch of the imagination between the renewable energies and the traditional fossil and nuclear-generating resources in our economy today.

This position was further thrown out of parity by the economic situation that industry finds itself in today with emphasis being placed on short-term, fluctuating rate money availability only and the decisions in energy generation and conservation investment being ostensibly long-term decisions.

From analysis, those are incompatible, of course. The result is that when coupled with our present tax policy which allows expensing of fossil fuels used in the business output that results in taxable income, there is no way in which a business in today's economy can rightfully make a decision for a major capital investment in energy conservation or energy generation.

The business energy tax credit's base for its implementation was to help bring about a parity situation. Since its enactment in 1980, the disparity that exists with the interest rates and the overall sluggishness of the economy has actually widened the gap. The 15-percent level does not come close to closing that gap, especially when the first-year cash analysis is made between the investment versus the expensing provision which exists.

To repeal that credit, of course, would totally abolish any opportunity even on a long-term basis to justify such a capital outlay. But because the economy is in such severe recession today and most likely will be a long time in coming out of it, and part of coming out of it is a need for improvement in our industrial base, we need to encourage investments in energy conservation and generation.

Thus, we need to encourage these investments through incentives so that business can show a parity position in making that decision. Without it, the corporations cannot in good conscience expend those capital moneys, especially with what little discretionary income that exists today.

Mr. FUQUA. There has been talk of an energy import tax or maybe a Btu tax. How would that affect solar energy? Would it put you in a more-favorable or less-favorable position?

Mr. LOOPE. From the commercial standpoint, which this tax credit is focused on, it would improve our analysis. The reason is that the capital investment periods are 3, 5, 7, and 10 years.

When you can point to some base threshold that energy will be at as a given, then the analysis is able to be made in more confidence and that the businesses are willing to expend their discretionary income in good faith and they will see some return on that investment over that period of time.

Fluctuation and indecision, of course, are the nemesis of the financial decisionmaking within corporations.

Mr. FUQUA. Mr. Mawhinney.

Mr. MAWHINNEY. Mr. Chairman, there are two issues you raised there. I hesitate to take them together because they have quite different effects on our business.

An import tax would have the effect of either raising or holding up the price, stabilizing perhaps the price of our competition, which is fossil fuel.

On the other hand, a Btu tax, depending on where it was applied, could penalize solar equally with the other fuels in which case it would have a null effect. So an import tax could perhaps be helpful by stabilizing prices at a higher level. And higher is better at this point in our development.

Mr. FUQUA. Mr. Lujan, do you have any questions?

Mr. LUJAN. Just quickly since we have a vote.

I suppose most of us on this committee have expressed our opinion that we ought to keep those tax credits, but I wonder, since they have been on since the late 1970's, what has been their impact? That comes about because we were at Grumman, I guess, 3 years ago just on the solar water heater and they were claiming that the indecision just really ruined their business when we finally did act, and then it took off.

What has been the experience in the industrial field?

Mr. MAWHINNEY. From our standpoint, Mr. Lujan, the major effect it had on us was to close the gap with the competition, to put it within reach of something we could have some control over, namely getting our costs down.

Mr. LUJAN. Did you sell more or not, that is the basic question.

Mr. MAWHINNEY. We are in the process of selling more. The problem we have had—and I think many of us have had—is the market development process is difficult, that includes more than cost, of course.

We have spent the last 2 years developing that market. We are now in a position with the credits in place of being able to offer things that are essentially economically acceptable.

They are technically acceptable.

Mr. LUJAN. But in the last 2 or 3 years, they have not really be applicable. You have not developed the market, it is just beginning to take off?

Mr. MAWHINNEY. The benefit was to let us do things like raise money in a joint venture to focus on the commercial development that we otherwise wouldn't have been able to do.

Now we will see the fruits of those credits.

Mr. LUJAN. If we brought interest rates down, would that have a better effect than the 15-percent tax credit?

Mr. MAWHINNEY. Depends on how far, of course, but certainly there is an effect. The effect will be as Mr. Blum and some of the folks spoke of earlier, part of the reason why these returns on investment requirements are quite as high as they are is interest rates.

If interest rates were down well less than 10——

Mr. LUJAN. Would eliminating the 15-percent tax credits help reduce the interest rates by reducing the amount of money that the Government has to borrow?

That is the dilemma we face. I should not ask you that. It is not a fair question, except when we look at every single program, that is the bottom line, really.

Can we balance the budget so we can bring down interest rates? Would this help?

Mr. MAWHINNEY. I would say it would devastate, not help. Perhaps for the wrong reasons.

We have to look at the process of development here. We are in the process of living with and responding to these high returns with the tax benefits. Take the credits away and I will guarantee that the rates of return will stay up for some time to come, during which time we would be out of business.

Mr. LUJAN. You are probably correct.

Thank you, Mr. Chairman.

Mr. LOWE. I would like to address this issue of what are the benefits to date of the tax credits.

From our point of view on the large wind turbines, it is a matter of timing. It has taken us since 1977 to get to the point that we are now, which is just on the threshold of commercialization.

We have not yet been able to take advantage of those tax credits. We are only now in a position to take advantage of them, and we have got a ceiling on time which is the end of 1985. It takes a long period of time, as I indicated, to do the negotiations with your customer, to build the hardware, and to get it in place.

The penalties to us as a contractor are severe if we do not meet schedules, since the loss of revenue to the entrepreneur is substantial if he does not get the wind turbines in place by the time the tax credits expire.

Mr. FUQUA. Particularly it would impact those by 1985.

Mr. LOWE. Yes, so these are long-term programs. We have to have a long lead time from contract start until expiration of the tax credits so we can proceed at acceptable risk.

You have to back off from the end date you have to meet with some margin so you are sure you can make it. I have been there with my management and, I assure you, they think of all kinds of things that can go wrong that prevent you from meeting schedules. So it is very important that we have more time to take advantage of the energy tax credits.

Mr. FUQUA. We have a vote now and I think we have generally concluded. We are probably all on the same side here, and I want to thank all of you gentlemen for being here and sharing with us your views on this matter.

Thank you very much for coming in.

The subcommittee will stand adjourned.

[Whereupon, at 12:07 p.m., the subcommittee was adjourned.]

APPENDIX

STATEMENTS SUBMITTED FOR THE RECORD

to the

SUBCOMMITTEE ON ENERGY DEVELOPMENT AND APPLICATIONS

COMMITTEE ON SCIENCE AND TECHNOLOGY

hearing on

BUSINESS ENERGY TAX INCENTIVES FOR RENEWABLE ENERGY RESOURCES

July 13, 1982

99-651 O—82——8

Statement of

Southern California Edison Company

Concerning the Federal Business Energy Tax Credit

Before the

Subcommittee on Energy Development and Applications

of the

Committee on Science and Technology

of the

United States House of Representatives

Washington, D.C.

July 13, 1982

I. Introduction

Southern California Edison Company is committed to the accelerated development and deployment of renewable and alternative energy resources. Members of this Subcommittee are familiar with one of our major pilot projects, the 10 MW Solar One facility, near Barstow California, which is now operational. As a result of our work with the Subcommittee in connection with Solar One, we are aware of your strong continuing interest in the development of renewable and alternative energy resources. We appreciate this opportunity to discuss the important role of the federal business energy tax credit in the development of these resources.

Based on our leadership role in the research, development and demonstration of emerging energy technologies and our extensive experience in negotiations with third party entrepreneurs to deploy these energy resources, we have concluded that this energy tax credit is an essential motivating force in the development of renewable and alternative energy resources. The credit reduces both the capital cost of these energy projects and the risks associated with the commercialization of these new technologies.

II. Southern California Edison Company's Commitment to the Accelerated Development of Renewable and Alternative Energy Sources.

Southern California Edison Company is an investor-owned electric utility with almost 200,000 shareholders. We serve a 50,000 square mile area of Central and Southern California, including some 800 cities and communities with a population of more than eight and a half million. We have over 14,500 employees. Our headquarters is in Rosemead, California. Edison provides electric service to residential and industrial customers, and to several municipalities which are resale customers. In 1981 Edison provided its customers with over 62 billion kilowatt hours of electricity (See Exhibit A).

Our corporate mission is to provide safe, reliable, and efficient electric service to our customers at fair prices while providing a fair and reasonable return to our shareholders. Throughout its history, Southern California Edison has recognized that in order to accomplish this mission we must find innovative solutions to the challenges presented by the changing world in which we live. This innovative approach began with our participation in the installation, in 1886, of the first commercial hydro-powered electric plant in California and is evi-

denced, most recently, in our participation in the construction and operation of the world's largest central receiver solar power plant.

On October 17, 1980, Mr. William R. Gould, Southern California Edison's Chairman of the Board, notified all employees, "It is the policy of Edison to devote our corporate resources to the accelerated development of a wide variety of future electrical power sources which are renewable rather than finite. These include wind, geothermal, solar, fuel cells, small hydroelectric, and continued emphasis on cogeneration, conservation and load management." Prior to this announcement, we projected that renewable and alternative energy projects would constitute about 14% of our new resource addition for the 1980's. Based upon our success in developing these resources since the 1980 commitment, we now expect 40% of the firm capacity addition to be alternative or renewable. With the recent addition of Solar One, Edison now utilizes eight primary energy resources -- oil, natural gas, coal, hydro, nuclear, wind, geothermal and solar -- more than any other electric utility in the world. Chairman Gould's directive for the future, our commitment to the development of renewable and alternative resources, is rapidly becoming a reality.

III. Characteristics of Renewable and Alternative Energy Facilities

Renewable and alternative resource facilities tend to be characterized by small size, expedited application and permit procedures, limited regulatory jurisdiction, and relatively brief construction periods. To the extent that a portion of new capacity additions replace existing oil- and gas-fired generation, each additional megawatt of capacity based on alternative and renewable energy resources reduces Edison's dependence on foreign oil. With this reduction in liquid fuel dependence comes the long-term potential for stabilizing the cost of service.

While the long-term outlook for renewable and alternative technologies is encouraging, and the potential contribution to the country is substantial, the development of these resources is not without risk. Near-term costs, which include research and development expenditures, manufacturing facilities, etc., do not compare favorably with the cost of proven, conventional technologies. Operating characteristics and technical performance of many of these technologies are not well defined and require further development and refinement. Edison, other utilities, entrepreneurs, the federal government and manufacturers have necessary roles to play if the widespread commercial deployment of these technologies is to become a reality.

IV. The Importance of the Energy Tax Credit

A. Southern California Edison's Experience

To date, we have successfully executed, with third party entrepreneurs, 96 contracts or letters of intent for renewable and alternative energy projects totaling about 2765 MW nameplate capacity (See Exhibit B). We believe that third party ownership of these emerging technology facilities will continue to play an important role in meeting future needs of our customers.

The energy tax credit has undoubtedly provided an effective economic incentive to the entrepreneurs to come forward with the deployment of these new technologies. In our dealings with entrepreneurs, a number of them have stated explicitly that the tax credit has been a key factor in determining that a specific project is economically feasible. Our past and present negotiations have assumed the continued availability of the energy tax credit.

In the case of technologies that are at or near commercial maturity, our experience confirms the value of the energy tax credit. For example, venture capital and investment partnerships are being formed to install small wind turbines and solar trough systems for the sale of electricity to Edison.

If the energy tax credit were not available, many of the new energy facilities under consideration and negotiation would not be built. We have estimated that we would lose access to at least 1100 MW of the potential renewable/alternative capacity should this tax credit be eliminated today. This lost capacity would save up to 4 1/2 million barrels of imported oil per year. Other electric utilities could also be seriously impacted. As a result, commercialization of these emerging energy technologies would be delayed substantially and our nation would be unable to lessen its high dependence on expensive foreign oil as rapidly as it might otherwise.

B. Need for the Energy Tax Credit

In passing the Crude Oil Windfall Profit Tax Act of 1980, Congress intended to provide energy tax credits to encourage investment in emerging technologies, to accelerate their subsequent commercialization process, and to reduce our nation's heavy dependency on foreign oil.

Congress recognized that the energy tax credit is a necessary step for the deployment of these emerging technologies and is in the national interest. In response to this Congressional commitment, the private sector has mobilized its resources and has built up substantial momentum toward this important national goal. However, with the uncertainties facing the energy tax credit, the private sector is receiving mixed signals in areas critical to its investment decisions. A renewed Congressional commitment to both the development of renewable energy resources and the continuation of the tax incentives is essential if the private sector momentum is to be maintained.

The majority of these renewable and alternative technologies are not yet cost competitive due to a variety of factors, including limited production, uncertain reliability, and high front-end costs. Unfortunately, costs will not come down until the market is established, and the market will not develop unless costs come down and reliability is established.

We believe that the continued availability of the energy tax credit is crucial to the development of renewable and alternative energy technologies, especially in light of the current federal emphasis on accelerating the transfer of these technologies to the private sector. The tax credit is in the public's interest and is the most cost-effective method of bringing renewable and alternative energy resources to commercial reality in the earliest time frame.

C. Energy Tax Credit Extension and Modification

Southern California Edison Company recognizes that this Subcommittee is not the committee of jurisdiction for amendments to the energy tax credit provisions of the Internal Revenue Code. However, because of your interest in the development of renewable and alternative energy resources, we offer the following suggestions for making the energy tax credits more effective in spurring such development.

As previously stated, the purpose of the federal tax credit is to make renewable and alternative energy technologies more cost competitive when compared to conventional, proven technologies and to provide assistance in overcoming the hurdles of accelerated deployment. Thus, it should be made available at least through the initial commercialization phase for each specific technology. This

early commercial stage will vary with the maturity, commercial readiness and the size of the technology being demonstrated or deployed. For example, solar parabolic trough, small wind turbine (less than 200 kW), small hydro and many cogeneration technologies are approaching commercial readiness, and continuation of the tax credits beyond 1985 may not be necessary. Large wind turbines, large biomass conversion facilities, and solar parabolic dishes require two to five-years of additional research, development and demonstration. Therefore, a continuation of the tax credits at least through 1988 for these technologies is essential. Solar photovoltaics, central receiver solar and possibly ocean thermal energy conversion (OTEC) will not be ready for commercial introduction until approximately 1988-1992 and, thus, will require tax credit incentives at least through 1992.

Another area in which the federal energy tax credit can be made more effective is by making this credit available to utility companies. The electric utility industry provides the largest market for renewable energy resources, and is thus constituting a primary driving force for early commercialization. Under the current tax code, utilities are not entitled to the energy tax credit. This is an unnecessary and arbitrary barrier to the accelerated commercialization of these technologies. Making the energy tax credit available to utilities would enable the private sector to proceed with the commercialization of these technologies in the broadest manner possible.

V. Conclusion

Southern California Edison Company appreciates this opportunity to present its views on such an important subject. As a leader in the industry in the development of renewable and alternative energy technologies, we will continue to devote our corporate resources to their accelerated deployment. Our analysis and recommendations are based on our extensive background and involvement in the technologies, as well as our on-going negotiations with entrepreneurs.

Thank you

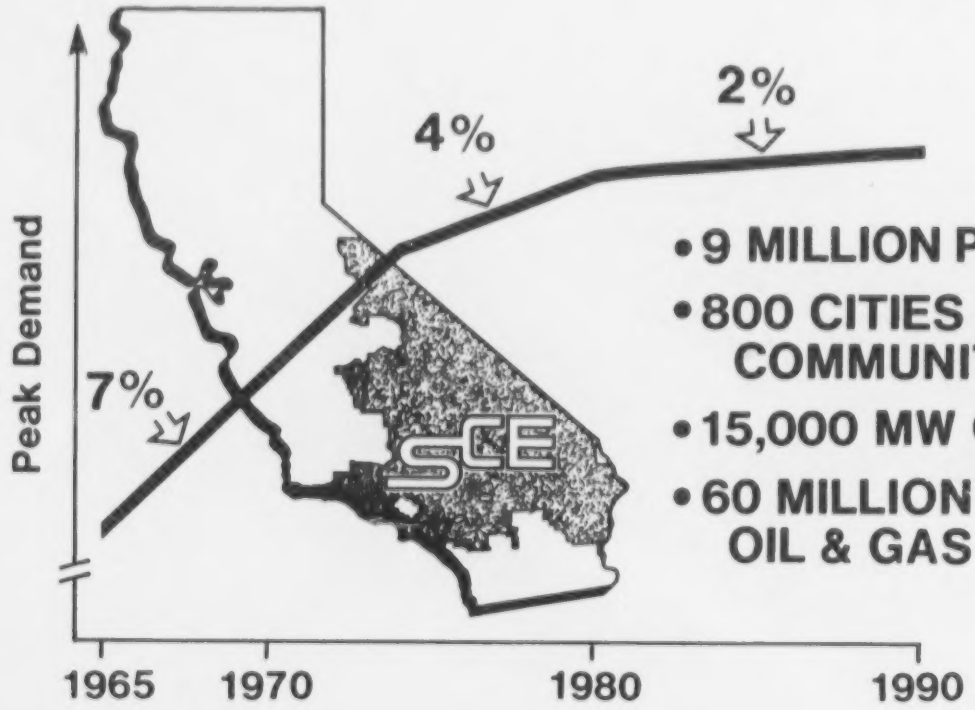
Exhibit A

Southern California Edison Company's

Commitment to Renewable and

Alternative Energy Technologies

SOUTHERN CALIFORNIA EDISON



- 9 MILLION PEOPLE
- 800 CITIES & COMMUNITIES
- 15,000 MW CAPACITY
- 60 MILLION BARRELS OIL & GAS

Electric System Planning
Fall 1981

Southern California Edison Company

POLICY STATEMENT

DEVOTE EDISON'S RESOURCES TO THE ACCELERATED DEVELOPMENT & DEPLOYMENT OF RENEWABLE & ALTERNATIVE ENERGY RESOURCES.

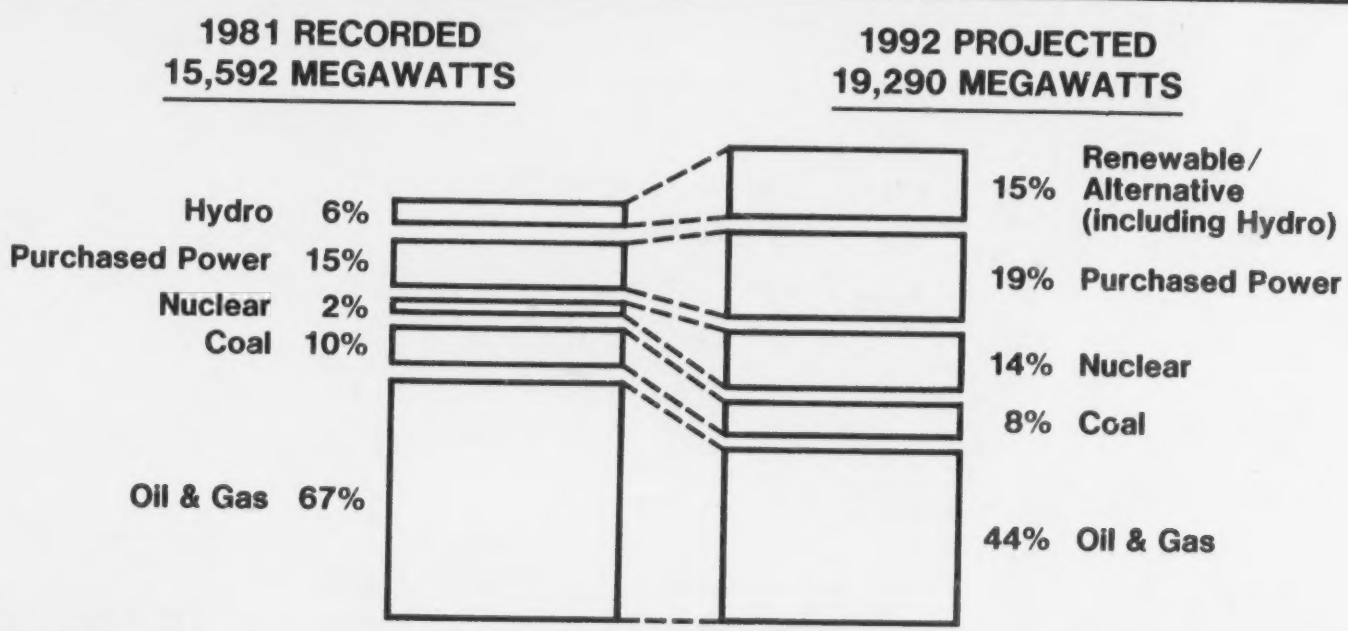
OCTOBER 17, 1980

1982 - 1992 PLANNED RESOURCES

		CAPACITY (MW)	
	Nuclear		2340
$	Purchases		2075
	Renewables / Alternate		2150
	Hydro	320	
	Small Hydro	200	
	Cogeneration	750	
	Wind	200	
	Geothermal	275	
	Solar	350	
	Fuel Cells	55	
	Load Management		1500

Electric System Planning
Summer 1982

GENERATION CAPACITY MIX



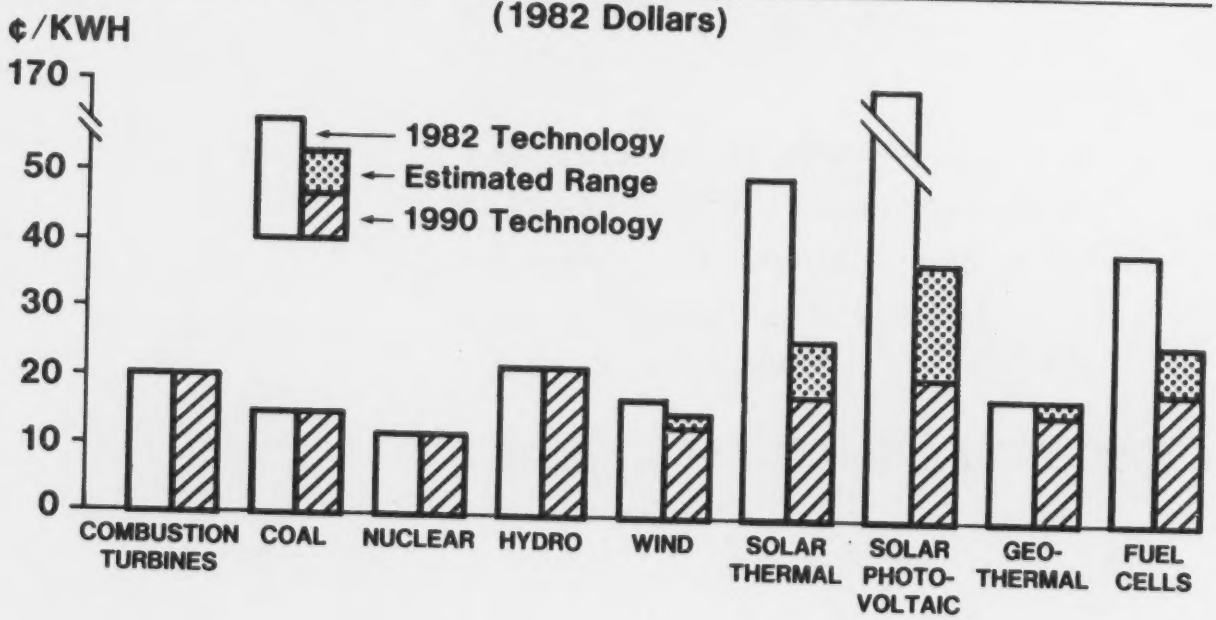
Electric System Planning
Summer 1982

BENEFITS OF RENEWABLE RESOURCES

- Shorter Lead Times
- Shorter Construction Periods
- Flexible Increments of Capacity
- More Rapid Cash Return on Investment
- Better Public Acceptance

LIFECYCLE POWER COSTS

(1982 Dollars)



R & D — Fall 1981

Exhibit B

Current Status of

Third Party Negotiations

with the

Southern California Edison Company

RENEWABLE/ALTERNATIVE ENERGY CONTRACTS

Technology	Executed Contracts No.	MW	Reached Principles of Agreement No.	MW
Wind	7	92	5	62
Solar	2	13	1	15
Hydro	16	557	3	285
Geothermal	4	140	2	57
Cogeneration	30	314	26	1230
Total	59	1116	37	1649

Grand Total: 96 Projects - 2765 MW

STATEMENT FOR THE RECORD - MARTIN-MARIETTA CORPORATION - July 13, 1982

FACTS ABOUT THE EXTENSION OF THE ENERGY TAX CREDIT

MARTIN MARIETTA CORPORATION

Martin Marietta Denver Aerospace, through its Solar Energy Systems Product Area, has been actively engaged in solar enery development since 1974. Our product lines include concentrating photovoltaic systems and solar thermal central receiver systems.

We are currently designing a $400m 100 MWe solar thermal central receiver (STCR) system which will be privately financed and owned, providing electricity at market prices to the Southern California Edison Company. This project, SCE Solar 100, will be ten times larger than any existing solar energy system, and will be financed by a third party interested in the technology and expecting to receive sufficient returns on his investment to compensate for his risks. Third party financing is essentially the only option open to commercialize renewable energy projects due to: 1) utilities' current capital constraints; 2) relatively high risks involved with the initial renewable projects; and 3) the regulated nature of utilities which prevents them from taking full advantage of the federal tax credits and other tax benefits. These credits help the third party investor compensate for the risk of such a large investment. For this project, the first one planned, the schedule assumes that plant construction will begin in early 1985 with the plant operational in 1988. The relevant business energy tax credits expire on December 31, 1985. so only a small part of the equipment and construction costs will be eligible for the credit. Extension of the renewable energy tax credit until 1990 or beyond is likely to make the difference between obtaining and not obtaining the financial commitment from third-party investors.

The benefits of securing an investor's commitment to Solar 100 goes far beyond the obvious benefits to Martin Marietta of making a sale. First, the solar thermal energy system will generate considerably more federal revenue than a conventional facility over its thirty-year life because there are no fuel costs to deduct from taxable income. Second, the project will stimulate production investments which will substantially reduce solar equipment prices in the future. Third, the construction of Solar 100 will not only stimulate other utilities to incorporate the technology into their planning, but will also encourage other suppliers to enter the market. A large number of utilities have already publicized their support for the technology as well as for the extension of the business energy tax credits, and SCE's willingness to lead the effort towards commercialization could be the turning point for commercial feasibility. Fourth, the successful completion of Solar 100 will establish clear precedence for overcoming regulatory tax, and other barriers to the technology's widespread use in the country. Finally, the Solar 100 project will spur U.S. solar power equipment production capability. This will help prevent the loss of the commanding lead the United States currently holds in the technology to foreign competition, and a major export potential may be realized.

For Martin Marietta Corporation, as well as for other suppliers, engineering firms and the utilities, the extension of the business energy tax credits will likely determine whether the country reaps the rewards of the investment made in STCR technology over the last eight years, and gains a crucial, cost-effective source of clean, renewable fuel for the country's energy supply.

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SERVAMATIC SOLAR SYSTEMS, INC.

July 13, 1982

STATEMENT OF JACKSON S. GOURAUD TO THE SUB-COMMITTEE ON ENERGY DEVELOPMENT AND APPLICATIONS COMMITTEE ON SCIENCE AND TECHNOLOGY, U. S. HOUSE OF REPRESENTATIVES.

HEARING ON THE ROLE OF BUSINESS INCENTIVES IN THE DEVELOPMENT OF RENEWABLE ENERGY TECHNOLOGIES.

TESTIMONY OF
JACKSON S. GOURAUD

It is a privilege for me to submit this testimony to the Science and Technology Committee of the House of Representatives. I have known your illustrious Chairman for some time, and it is a pleasure for me to testify.

I believe that I have extensive hands-on-knowledge of the benefits of commercial solar tax credits. As President of Energy Clinic Corporation, a public company, which has on the 7th of July, 1982, merged with Servamatic Solar Systems, Inc., of which I am now Chairman.

Both Energy Clinic and Servamatic are large suppliers of conservation and solar technology both informational, consulting and product in the commercial area.

Energy Clinic, for example, has, in the bowling center business, made numerous installations in Florida, New York, Connecticut, Missouri, Arizona and California, to name a few.

CORPORATE HEADQUARTERS
1641 CHALLENGE DRIVE • CONCORD, CA 94520 • (415) 680-8853

Servamatic has made a number of commercial installations in California.

Both companies are persuaded that without the tax credit, these orders would not have been realized.

Servamatic's marketing philosophy has been to install solar devices on commercial buildings and guarantee full cost recovery within five years. Energy Clinic's marketing philosophy guarantees the purchaser a reduction of 30% in his consumption of fuel and a cost recovery within 36 months.

In industry, there is an expression called hurdle rate which means cost recovery within a specific time frame, generally two years. Without the tax credits, industry would not even take time to examine the economics of a conservation or solar installation.

In my judgment, this Committee should examine the feasibility of increasing commercial tax credits and extending their life until the end of this decade.

An additional disruption in our fuel supply is inevitable and the more alternate energy we have in place, the more secure this nation will be.

I entreat the Committee to examine an increase in commercial tax credits.

Respectfully submitted,

SERVAMATIC SOLAR SYSTEMS, INC.

Jackson S. Gouraud
Chairman

SERVAMATIC SOLAR SYSTEMS, INC.

June 4,1982

Petar's Restaurant
32 Lafayette Circle
Lafayette, CA 94549

Attention: Mr. Mealo Jakovina

Dear Sir:

In respect to the site survey of Petar's Restaurant, I am pleased to submit the following recommendations.

The Restaurant facilities will require a total of six (6) Sun Flow collectors. Including all taxes, permitting, insulation of all exposed hot water lines, special rack and complete installation.

Total investment.....	$ 9,230.00
Less State Tax Credit of 25%.....	2,307.50
Less Federal Tax Credit of 15%.....	1,384,50
Less Federal Investment Tax Credit of 10%....	923.00
Net five (5) year cost.....	118.59
Less net Domestic Gas hot water savings - five (5) year projection - Total*.....	$ 4,496.41

~~Gas savings on domestic hot water use will be up to 70% annually without any parasitic energy use against the savings.~~

Tax credit information is our interpretation only and is subject to final approval by your accountant. We have made every effort to provide you with correct information.

Immediate appreciation in property equals $ 9,230.00. Per California Assembly Bill 375, passed in 1981 this property assessment will NOT increase your property tax assessment value!

All prices are f.o.b. location. Prices include all taxes, permitting and installation chrges with the exception of trenching through cement, which is billed at time and materials.

All work will be done under State Contractors' License No. 390645.

Terms: CASH - 10% Down, Balance Due on Completion of Installation, or

100 % Financing available to Qualified Buyers.

Warranties: All material and workmanship concerning plumbing are quarantied for one (1) year.

The Sun Flow Domestic Hot Water System is warrantied for ten (10) years, with a life expectancy of 50 years.

This quotation will be in effect until July 4,1982.

Please call me directly if I can be of further assistance.

Sincerely,

Jerry Jackson
Solar Consultant
Commercial Division

JJ:plh

* Gas savings estimation is based on information from P.G.&.E.'s "Residential Gas Increase January 1973 thru June 1970 Chart". The estimated gas increase per year is 30%. While this increase cannot be quaranteed, the actual percentage of increase from January of 1979 through June 30,1980 was more than 100%. Savings estimated on day time use of collectable B.T.U.'s from the sun in your area according to the California Solar Data Manual of March 1978.

SERVAMATIC SOLAR SYSTEMS, INC.

February 9, 1982

Property Owner
Walnut Gardens Apartments
125 Parmac Road
Chico, CA 94926

Dear Property Owner:

Per the request of Mr. Murt Meyer, I have surveyed your apartment complex located at 125 Parmac Road, Chico, California and I am pleased to submit the following recommendations.

I suggest a 24 unit Sun Flow Domestic Hot Water System for your apartment complex.

INVESTMENT

Sun Flow Domestic Hot Water Heating System - 24 Units	$30,490.00
Less 15% Federal Energy Tax Credit -	(4,573.50)
Less 40% State Energy Tax Credit -	(12,196.00)
Less Gas Savings (Estimate) - 5 Years -	(17,472.48)
Net Savings - 5 Year Projection -	$ 3,731.98

PLUS

Immediate Appreciation of Property	$30,490.00

In keeping with our company policy, we have attempted to minimize all savings and would sincerely hope you will realize even greater savings over the next five (5) years.

All prices are f.o.b. location. Prices include all taxes, permitting and installation charges with the exception of trenching through cement, which is billed at time and material. In addition to the above, Servamatic Solar Systems, Inc. will insulate all exposed hot water lines for additional savings.

CORPORATE HEADQUARTERS
1641 CHALLENGE DRIVE • CONCORD, CA 94520 • (415) 680-6855

All work will be done under State Contractors License Number 390645.

Terms: CASH - 10% Down, Balance Due on Completion of Installation.

Warranties: All materials and workmanship concerning plumbing are guaranteed for one (1) year.

The Sun Flow Domestic Hot Water System is warrantied for ten (10) years, with a life expectancy in excess of 50 years.

This quotation will be in effect until March 9, 1982.

Please call me directly if I can be of further assistance.

Sincerely,

Jerry Jackson
Sales Manager
Commercial Division

JJ:dll

*Gas savings estimation is based on information from P.G.&E.'s "Residential Gas Increase January 1973 thru June 1979 Chart". The estimated gas increase per year is 30%. While this increase cannot be guaranteed, the actual percentage of increase from January of 1979 through June 30, 1980 was more than 100%. Savings estimated on day time use of collectable B.T.U.'s from the sun in your area according to the California Solar Data Manual of March 1978.

SERVAMATIC SOLAR SYSTEMS, INC.

February 1, 1982

Mr. Bob Morton
1074 East Avenue, Suite F
Chico, CA 95926

Dear Mr. Morton:

I have surveyed your apartment complex and I am pleased to submit the following recommendations. I suggest a four (4) unit Sun Flow domestic hot water system on each four plex and a five (5) unit system on each four plex with a laundry room.

This proposal contains two (2) cost and savings analyses, one (1) system that includes a laundry room and one (1) that does not.

INVESTMENT

Sun Flow Domestic Hot Water Heating Systems - Four (4) Units	$4,800.00
Less 15% Federal Energy Tax Credit	(720.00)
Less 40% State Energy Tax Credit	(1,920.00)
Less Estimated Gas Savings - 5 Year Total*	(4,125.46)
Balance (PROFIT) - 5 Year Projection	$1,965.46
PLUS	
Immediate Appreciation of Property	$4,800.00

INVESTMENT

Sun Flow Domestic Hot Water Heating Systems - Five (5) Units	$6,000.00
Less 15% Federal Energy Tax Credit	(900.00)
Less 40% State Energy Tax Credit	(2,400.00)
Less Estimated Gas Savings - 5 Year Total*	(5,156.83)
Balance (PROFIT) - 5 Year Projection	$2,456.83
PLUS	
Immediate Appreciation of Property	**$6,000.00**

CORPORATE HEADQUARTERS
1641 CHALLENGE DRIVE • CONCORD, CA 94520 • (415) 680-8853

In keeping with our company policy, we have attempted to minimize all savings and would sincerely hope you will realize even greater savings over the next five (5) years.

All prices are f.o.b. location. Prices include all taxes, permitting and installation charges with the exception of trenching through cement, which is billed at time and material. In addition to the above, Servamatic Solar Systems, Inc. will insulate all exposed hot water lines for additional savings.

All work will be done under State Contractors License Number 390645.

Terms: CASH - 10% Down, Balance Due on Completion of Installation.

Warranties: All materials and workmanship concerning plumbing are guaranteed for one (1) year.

The Sun Flow Domestic Hot Water System is warrantied for ten (10) years, with a life expectancy in excess of 50 years.

This quotation will be in effect until March 2, 1982.

Please call me directly if I can be of further assistance.

Sincerely,

Jerry Jackson
Sales Manager
Commercial Division

JJ:dll

*Gas savings estimation is based on information from P.G.&E.'s "Residential Gas Increase January 1973 thru June 1979 Chart". The estimated gas increase per year is 30%. While this increase cannot be guaranteed, the actual percentage of increase from January of 1979 through June 30, 1980 was more than 100%. Savings estimated on day time use of collectable B.T.U.'s from the sun in your area according to the California Solar Data Manual of March 1978.

SERVAMATIC SOLAR SYSTEMS, INC.

May 18, 1982

Redwood Motel
1670 Santa Rosa Avenue
Santa Rosa, California

Attention: Mr. Bob Tobin

Dear Sir:

In respect to the site survey of your complex, I am pleased to submit the following recommendations.

That you install an 11-unit Sun Flow Domestic Solar Hot Water System. The system is a hybrid integral storage collector with no moving parts. There will be no need for electricity with this sytem because there are no pumps, controls or sensors.

The following is a cost and savings projection.

Eleven (11) Sun Flow Domestic Solar Collectors.
Collectors mounted on roof, plumbed complete to all four (4) existing 70-gallon water heaters.

Total Investment	$15,920.00
Less 15% Federal Tax Credit	(2,388.00)
Less 25% State Tax Credit	(3,980.00)
Less 10% Federal Investment Tax Credit	(1,592.00)
Less Gas Savings Estimate (5 Year Projection)*	(8,917.94)
Net Savings - 5 Year Projection	$ 957.94

PLUS

Immediate Appreciation of Property.....$15,920.00
Per California Assembly Bill 375, passed in 1981, this property appreciation will NOT increase your property tax assessment value!

CORPORATE HEADQUARTERS
1641 CHALLENGE DRIVE • CONCORD, CA 94520 • (415) 680-8855

In keeping with our company policy, we have attempted to minimize all savings and would sincerely hope you will realize even greater savings over the next five (5) years.

Tax credit information is our interpretation only and is subject to final approval by your accountant. We have made every effort to provide you with correct information.

All prices are f.o.b. location. Prices include all taxes, permitting and installation charges with the exception of trenching through concrete, which is billed at time and material. Servamatic Solar Systems, Inc. will insulate all hot water lines to and from the solar system for additional savings.

All work will be done under State Contractors License Number 390645.

Terms: CASH - 10% Down, Balance Due on Completion of Installation.

Warranties: All materials and workmanship concerning plumbing are guaranteed for one (1) year.

The Sun Flow Domestic Hot Water System is warrantied for ten (10) years, with a life expectancy in excess of 50 years.

This quotation will be in effect until June 18, 1982.

Please call me directly if I can be of further assistance.

Sincerely,

Angelo Bricolias
Solar Consultant

AB:JJ:dll

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*Gas savings estimation is based on information from P.G.&E.'s "Residential Gas Increase January 1973 thru June 1979 Chart". The estimated gas increase per year is 30%. While this increase cannot be guaranteed, the actual percentage of increase from January of 1979 through June 30, 1980 was more than 100%. Savings estimated on day time use of collectable B.T.U.'s from the sun in your area according to the California Solar Data Manual of March 1978.

SOLAR ENERGY INDUSTRIES ASSOCIATION Suite 800 1001 Connecticut Avenue, NW Washington, DC 20036 202 293 2981

SEIA

STATEMENT OF

FRANK F. DUQUETTE

CHAIRMAN-CENTRAL RECEIVER TECHNOLOGY COMMITTEE

SOLAR THERMAL DIVISION

SOLAR ENERGY INDUSTRIES ASSOCIATION

Subcommittee on

Energy Development and Applications

of the

Committee on Science and Technology

U.S. House of Representatives

July 13, 1982

13 July 1982

ENERGY INVESTMENT TAX CREDITS

Mr. Chairman, in addition to Mr. Loope's comments, let me spend a few minutes to focus on the importance of investment tax credits, more specifically to solar thermal technology. Parabolic troughs, dishes and central receiver systems now have successfully operating hardware in the field. A solar thermal industry is beginning to develop in this country. Suppliers and investors are poised to take the final step in the transfer of this promising technology to the commerical market.

The issue before us today is the need for continuing government support in the form of investment tax credits. The Administration's FY '83 budget request of February 5, 1982 called for repeal of the 15% renewable energy tax credit effective 1 January 1983. This tax credit legislation currently in effect through December 1985 was enacted to stimulate private capital investment in the renewable energy technologies such as solar thermal, wind and geothermal to reduce the nation's dependence on imported oil. Although this tax credit for industry has already proven to be productive, we believe that its full benefits have yet to be realized as a continuing benefit to our economic recovery program.

As an example of the value of this tax credit to private industry, let me describe its importance to solar thermal central receiver business development activities.

During the past decade, a number of industrial firms have been involved in the development of technology for solar thermal central receiver power plants both as a system designers and hardware manufacturers. The 10 MW electric pilot plant developed with govern-

ment and industry funding has been successfully operating at Barstow, California since April of this year. Our studies show that this solar thermal technology has significant commercial potential once the industrial base for both users and suppliers has been established.

The name of the game for central receivers is cost reduction, principally in heliostat hardware. Hardware costs come down significantly with quantity production. Tax credits attract capital to build power plants, to fund production facilities for lower cost, reliable heliostat units.

At this time a number of industrial teams are engaged in discussions with both electric utility and oil companies relating to proposed commercial projects ranging in size from 1 MWe to 100 MWe. Since these will be first of a kind projects, there will necessarily be significant nonrecurring development costs and higher initial recurring costs, typically encountered in projects utilizing new technology. For this reason, it is difficult for the initial plants to compete with the current market prices of conventionally fueled plants without incentives to encourage private investment.

With construction times of 4-5 years for solar thermal electric and industrial process heat systems, a number of investor consortiums are already planning site-specific projects that will be completed after December 1985 when the tax credit provision is due to expire. This is an additional reason why it is important that these tax credits be not only maintained, but extended beyond 1985 to 1992. Without the extension "grandfathering" will be essential for those projects that have made "affirmative commitments" for completion.

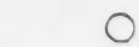
A recent study by A. D. Little Associates concluded that the Treasury Department will actually profit from the tax credit program by encouraging private investment, creating thousands of new jobs and returning new revenues to the treasury.

In addition to the economic benefits, the development of non polluting affordable renewable energy supply options will reduce the nation's dependence on imported oil. For example a 100 MWe solar electric plant would have a capital cost of approximately $400 million and would displace approximately 1 million barrels of oil per year. With an indicated potential market for 100 of these plants through the year 2000, a total annual displacement of 100 million barrels of oil per year is achievable.

Similarly, a smaller 50 MMBTU/Hr solar steam generation plant for enhanced oil recovery applications would cost approximately $7 million and would displace 24,000 barrels of oil per year. With an indicated potential market for 500 of these plants through the year 2000, an additional annual savings of 12 million barrels of oil can realized.

Lastly, it is believed that the loss of the 15% energy tax credit will place U.S. Industry at a disadvantage in competing with foreign countries such as Japan, France and West Germany, whose governments continue to invest heavily in the promotion and development of renewable energy technology and products.

To summarize, the energy investment tax credit is a way of compensating for the increased cost of risk capital for a strategic infant industry. Investment Tax Credits will generate a flow of venture capital to those companies with the ability to undertake successful design, construction and operation of projects likely to be economically competitive.

Mr. Chairman, thank you for providing an opportunity to offer a solar thermal industry view on the current and continuing need for energy investment tax credits and their extension to 1992.

Reference: A. D. Little Report #86363
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Vol. I, November 1981